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THE SQUAW ROCKSHELTER (33CU34): A STRATIFIED ARCHAIC DEPOSIT IN CUYAHOGA COUNTY

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ABSTRACT

The Squaw Rockshelter site (33CU34), located along a tertiary tributary to Lake Erie on the edge of the Glaciated Allegheny plateau in northeast Ohio, contained stratified sealed deposits. A small remnant dated 9240±160 B.P., yielded fragments of a human skeleton, unifacial and bifacial scrapers, unstemmed lanceolate points, and a corner-removed indented-base point. Additional lanceolate and bifurcate-base points have eroded from this deposit. This lower cultural level, relatively continuous across the rear of the shelter, represents a drip-line depression washed by water.

Within a thin zone overlying superimposed rockfall, a hearth dated to 5500±85 B.P. is associated with a fragment of charred cordage. This level yielded expanded stemmed points, bifacial knives and drills. The occupation surface could not be traced aeross disturbed areas of the shelter.

The early Archaic lithic assemblage included both Plano projectile point styles of the Great Lakes and corner-notched types of the southern Appalachians, while the late Middle Archaic projectile points represent a local blending of styles typical in the riverine midwest and the Mid-Atlantic states.

Skeletal remains recovered from the Early Archaic level of the Squaw Rockshelter were identified as belonging to a young female Amerindian. Analyses of the limited fragments and dentition suggest a balanced diet of moderate coarseness. No pathologies or trauma were noted. Two teeth from other individuals were also present.

Introduction

Squaw Rockshelter (33CU34) is a small and partially disturbed site on the southwest bank of Aurora Branch, a second order tributary of the Chagrin River. The site is located in the South Chagrin Reservation of the Cleveland Metropolitan park system, Bentleyville Township, Cuyahoga County, Ohio (Figure 1).

The discovery of the site occurred in 1974.[1] Having followed the riverbank 500m upstream from the 1884 carving "Squaw Rock," Robert M. Brose noticed a lanceolate biface of Upper Mercer flint exposed in a silty colluvial deposit veneering the riverbank. Within minutes a bifurcate-base projectile point, also of Upper Mercer

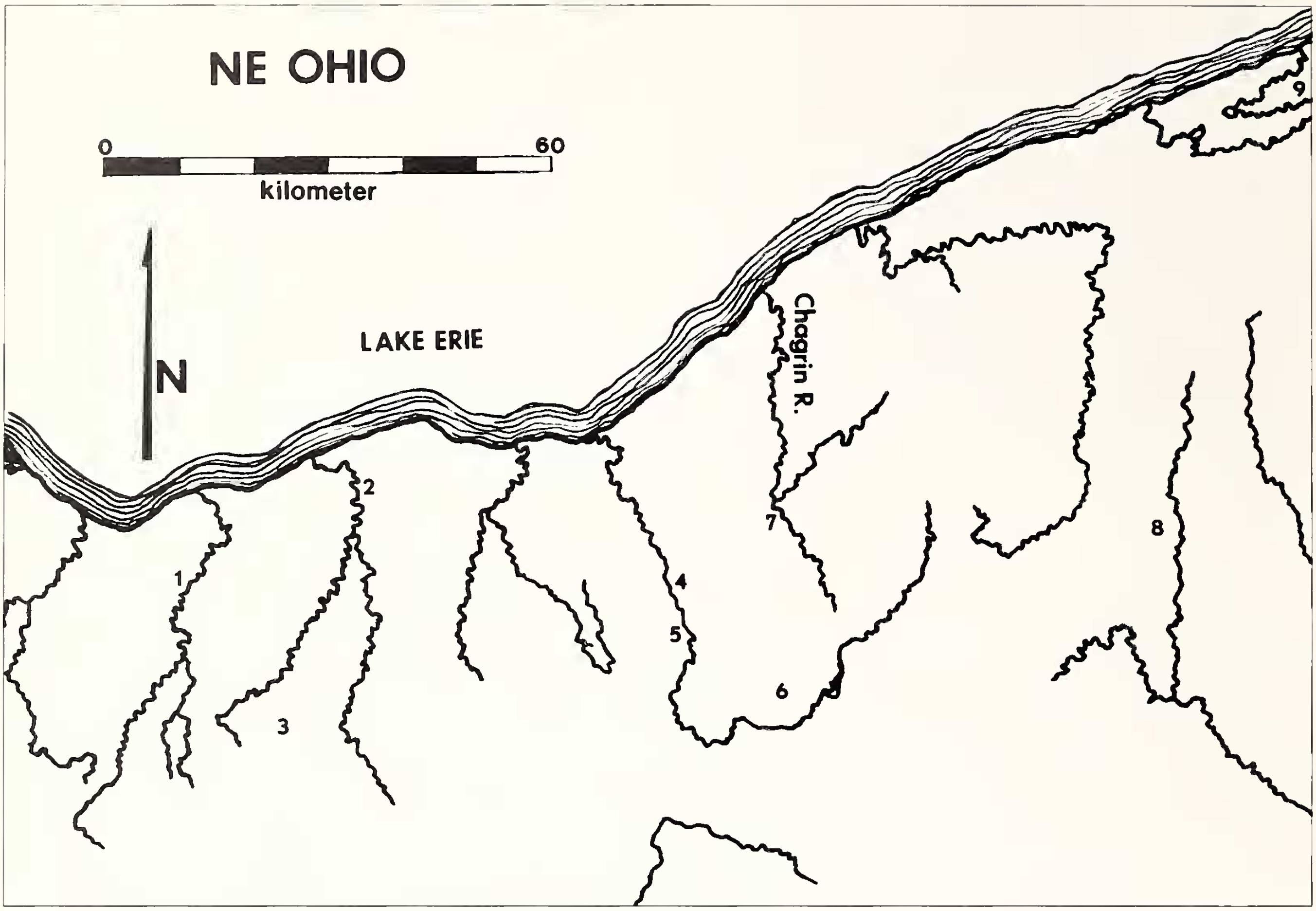

FIGURE 1. *The location of northeast Ohio sites mentioned in text: 1 — Cooper Hollow; 2 — Burrill Hill Orchard; 3 — Ziegler; 4 — Regis; 5 — Hogue's Spring; 6 — House and Lukens; 7 — Squaw Rockshelter; 8 — McKiben; 9 — Holdson District*

flint, was recovered from a higher gully in the same sediments by Thomas A. Brose. By the end of that afternoon a small lanceolate point of mottled glacial chert and a second bifurcate-base point of Upper Mercer flint had been collected. The condition of three of the four artifacts suggested a primary depositional context. Permission to investigate was obtained from Mr. Harold Growth II, Cleveland Metroparks Director.

That autumn the colluvial fan was traced to a presumed terrace behind several large sandstone blocks, 3.5m higher than the river. Excavation quickly revealed a partially collapsed rockshelter, with deposits protected from the river by massive blocks of sandstone detached from the overhanging cliff 2m south. By the end of the first day only a single unit, 1.0m x 1.25m, had been excavated to a depth of 1.40m. The entire deposit was estimated to include a zone less than 2.25m from front to back, extending along Aurora Branch for 15m. This zone

TABLE 1
ARCHAEOLOGICAL EXCAVATIONS AT 33CU34

Excavation Unit	Surface Area	Maximum Depth	Actual Volume Excavated
1	1.5m x 1.5m	145cm	$2.4m^3$
2	1.25m x 1.0m	137cm	$1.4m^3$
3	1.50m x 2.0m	128cm	$2.8m^3$
4	1.50m x 1.75m	95cm	$1.8m^3$
5	2.0m x 1.75m	153cm	$2.5m^3$
TX	1.50m x 0.50m	85cm	$0.6m^3$

FIGURE 2A. *View from old quarry on north bank, of large roof fall blocks protecting the Squaw Rockshelter site.*

FIGURE 2B. *View to west in Squaw Rockshelter, figures on surface of Unit 3 before excavation.*

contained large blocks of sandstone rising like icebergs through the unconsolidated deposits (Figure 2a, b). The largest area between such obstacles was only 2.5m x 1.5m. The Cleveland Metroparks insisted that no excavation be left open; that personnel be limited; and that there be no publicity until work was completed. Due both to previous commitments and current academic concerns, I agreed to personally undertake the fieldwork and analyses, and to curate recovered materials at The Cleveland Museum of Natural History. This arrangement was accepted by Harold Mahan, Director of the Museum in December 1974.

Through the 1975 summer $13m^2$ in four units and a single exploratory trench were excavated into the unconsolidated deposits at the Squaw Rockshelter site (Table 1, Figure 3). It is estimated that the $11.5m^3$ excavated represent 85% of the site preserved from erosion. This is a small and somewhat biased sample of what may have been $40m^3$ of sediment. Nevertheless, these deposits offered evidence to support a different interpretation of the Archaic of northeast Ohio than existed prior to 1975.

Cultural and Historical Background

Early descriptions of Ohio antiquities concentrated upon earthworks and the artifacts they contained (Brose 1973). Stone tools that appeared more primitive, and badly decayed human bone from river banks, wells, and mines were compared to materials recovered from purported Pleistocene deposits in other states. Most such reports were ignored, since human occupation of the New World was not considered to be of great antiquity (cf. Fowke 1902), and those sites subjected to detailed scrutiny turned out to be of dubious antiquity (Holmes 1919). The association of artifacts with extinct fauna not only demonstrated respectable antiquity for western Amerindians, but revealed projectile points with analogues throughout North America. Shetrone (1936) noted the frequency of such points in Ohio, but lack of any stratigraphy limited temporal interpretation. Subsequent studies (Tuck 1978) have revealed eastern PaleoIndian sites with a variety of projectile point forms. Later PaleoIndian lanceolate point types documented from the plains were also recovered in the Great Lakes-Ohio Valley, and geochronological correlations suggested considerable age for these types in the midwest (Mayer-Oakes 1955; Mason 1958).

There seemed good reason to regard the east as having been occupied as early as the west (Mason 1962). Highland rockshelters and deep stratified sites in floodplains yielded fluted points as well as partially fluted,

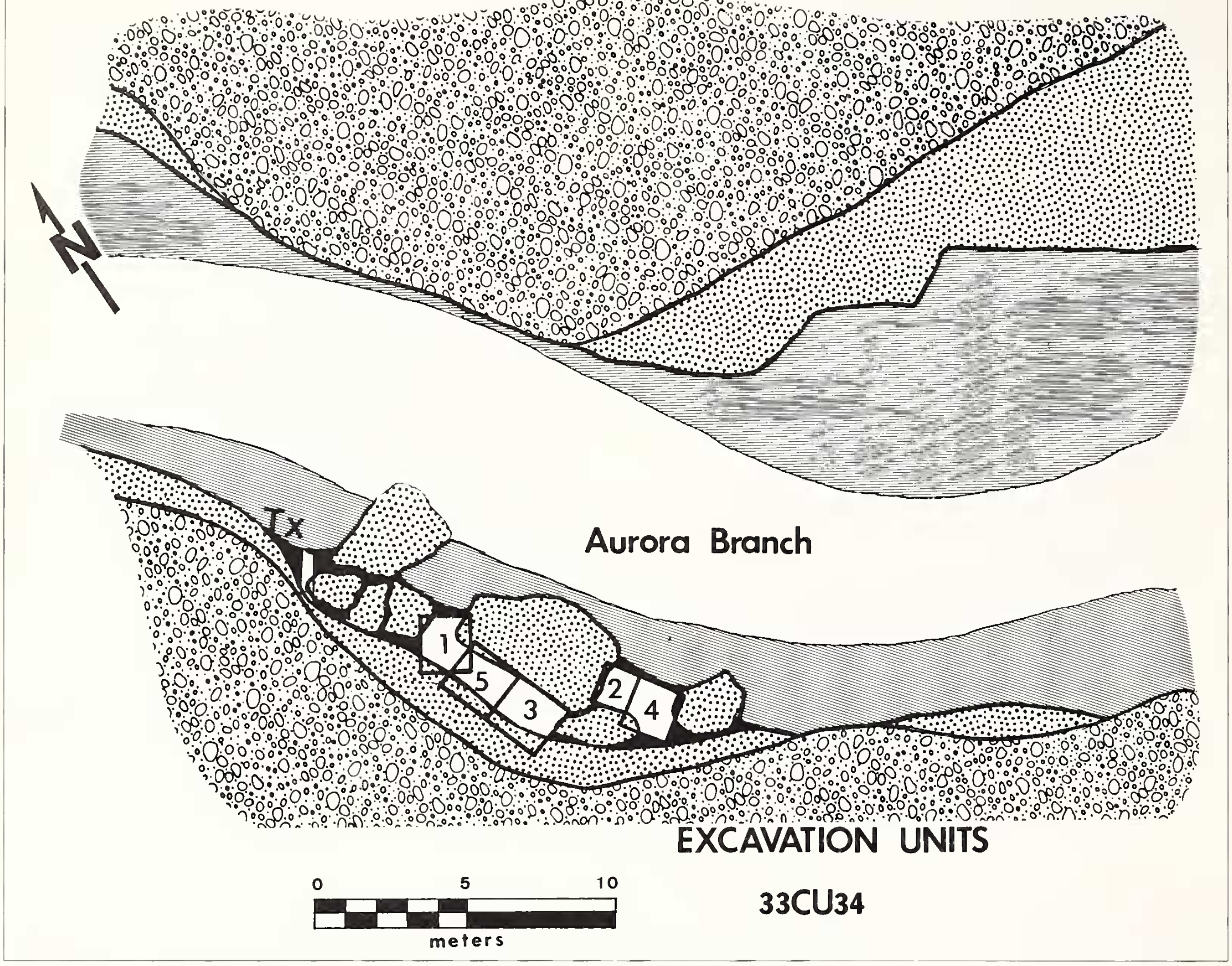

FIGURE 3. *Excavations at Squaw Rockshelter site.*

unfluted, and notched projectile points showing a transition in lithic technology from the PaleoIndian period into the early Middle Archaic period (Coe 1964; DeJarnette *et al.* 1969; Griffin 1974; Chapman 1977). These sites have been taken to indicate a wide-spread, and synchronous series of changing projectile point styles with little or no overlap of differing types at any component or at any given time over nearly 1500 air miles from Maine to Mississippi (Broyles 1971; Dincauze 1975; Bense *et al.* 1983). It was a situation unparalled by the Early Archaic in the Midwest.

From the Dakotas into western Ohio, PaleoIndian points precede development of the prairies. With the Hypsithermal, both prairies and gallery forest zones yield assemblages of stemmed and unstemmed lanceolate and partially fluted projectile points. By 9500 B.P., as the prairie fingered eastward, the grasslands yield assemblages in which lanceolate projectile points predominate, while forested areas yield assemblages in which corner-notched and side-notched projectile points predominate. Short-duration components at ecotones from 9500 B.P. to 6500 B.P. lithic assemblages contain a variety of stemmed and unstemmed lanceolate projectile points as well as a variety of expanded stemmed and/or corner-removed, and side-notched and corner-notched projectile point types.

While the stemmed and unstemmed lanceolate projectile points from the Great Lakes suggested relationships to the Plano complex further west (cf. Mason 1981:114-126), they were also compared to Late Archaic points, from 5000 B.P. to 3500 B.P. further west, or to similar projectile points in the St. Lawrence or Atlantic drainages of Pennsylvania and New York, dated to the end of the Middle Archaic (cf. Dragoo 1959). Those who argued a late date for the stemmed and lanceolate points in the Great Lakes claimed that the accompanying corner-removed or notched points related to Normanskill points, Brewerton points, Otter Creek points or even Snook Kill points, dated between 6500 B.P. and 3500 B.P. in the east. Those who viewed the Great Lakes lanceolates as early related the corner-removed or notched points to Thebes, Hardin barbed, Graham Cave side-notched, Kirk corner-notched, and St. Albans side-notched types, dated between 9500 B.P. and 6500 B.P. in river drainages to the south and west (Brose 1975).

The absence of components that yielded only a single clearly identified point type suggested to some that there were no Early or Middle Archaic occupants of the region at all. Assuming a PaleoIndian focal adaptation to tundra-edge hunting, Fitting (1968, 1970) argued for a post-PaleoIndian depopulation of the Great Lakes, suggesting the 9000 B.P. rise from low levels created a lakeshore unfavorable to human occupation. Those few possible large Early and Middle Archaic sites, he believed, were now drowned, having been located along waterways, as in the southeast, and only smaller interior hunting camps still existed. This ignored controversy about the reality of any such pattern in the south. Mason however, argued that the 4500 years between PaleoIndian and Archaic economy and technology represent

> ...gradual transition from one dominant culture type to another...in the Great Lakes, enough is known to encourage the view that the perception of two partly coetaneous cultural traditions is accurate.
> (1981:114-115)

Indeed, Ellis and Deller (1986:56-57) speculated that in southern Ontario and lower Michigan Early Archaic Kirk and Plano types would co-occur by 8900 B.P., while Middle Archaic side-notched forms should resemble Godar, Brewerton-like Thebes, and Otter Creek by 4500 B.P. (cf. Lovis and Robertson 1985). Candidates for the 9500-6500 B.P. period in the Great Lakes, thus included both lanceolate projectile points, and the corner-removed, stemmed, bifurcated base, and notched projectile point clusters dated between 10,000 B.P. and 6500 B.P. to the west, and dated between 9500 B.P. and 3500 B.P. in areas east of Ohio. Ohio remained an enigma.

In the upper Ohio Valley Mayer-Oakes (1955) had assigned stemmed and lanceolate projectile points to an early Archaic horizon, while Dragoo assigned a similar lithic assemblage (which included corner-removed/side-notched points) to a "proto-Laurentian culture" with at least one radiocarbon date as late as 5310±180 B.P. (Dragoo 1959:238-239). Nonetheless, the lowest levels of the Rohr shelter, with Steubenville lanceolate points, yielded a Dalton point while in the Allegheny River valley lanceolate-free Brewerton components date to 5800 B.P. (Caulkin and Miller 1977) and to 6090 B.P. (George and Davis 1986). As in the upper Ohio Valley, the lanceolate points of northern Ohio have been called Early Archaic, Late Archaic, or both. Few components reported dated between 9500 B.P. and 3500 B.P.

The first serious attempt to address the PaleoIndian and early Archaic occupation in northern Ohio, was initiated by Olaf Prufer (1961). Based upon survey by Prufer and his associates between 1958 and 1963, a study of the distribution of various types across Ohio was published (Prufer and Baby 1963). Given the nature of the sampling, chronological typology was based upon distant analogues. Not all of these have received radiometric support, and the relationships between the survey sample, sampling methods and sampling framework have been a source of contention (Seeman and Prufer 1982; Lepper 1983). Beyond stimulating research, these studies illustrated the variability and standardized the terminology for early Ohio projectile points.

Although recognizing their differing temporal positions, the Plano points in northwestern Ohio and the fluted points of southern Ohio were attributed to contemporary immigrations from the upper Great Lakes and the Appalachians. After discussing specific sites Prufer and Baby found

> ...no evidence permitting the linkage between the PaleoIndian assemblages of Ohio and *established* local Archaic complexes.
> (1963; emphasis added)

The problem was that in 1963 there were no established local Archaic complexes other than mortuary aspects of the Late Archaic. Although Mayer-Oakes suggested continuity, Prufer and Baby agreed with Dragoo that there were no Archaic predecessors in any Ohio late PaleoIndian site assemblage. They accepted Dragoo's chronology, and his implication that no lanceolate projectile point in eastern Ohio was early.

Geistweit argued that Kirk and LeCroy points had been recovered in all regions of Ohio save the northeast (1970:1-32, figs. 9-16). She too saw no evidence for PaleoIndian Early Archaic continuity, and offered no explanation for a proposed rapid introduction of Early Archaic as a style horizon or as an economic pattern (1970:162-164). Claiming dense Late Archaic occupation of those same regions (1970:45-88) Geistweit suggested that the Middle Archaic in Ohio was represented by a "...continuation of Early Archaic tool types and way of life..." (1970:44, 164) The occupational hiatus was between 5000 B.C. and 3000 B.C. for Geistweit, who found little local precedent for regional Late Archaic variants, especially along the Ohio River valley.

Blank (1970) synthesized data from collections in northern and west central Ohio with excavations in east central Ohio. Despite the paleoecological data with which he sought to support his model, every surface collection was selective, and other than at quarries all sites showed a mixture of lanceolate, stemmed and notched point types. No site yielded floral or faunal remains, and there was confusion of single site activity with economic adaptation. Placing the late PaleoIndian and Early Archaic periods between 8000 and 5000 B.C., Blank suggested that lanceolate points characterized northwestern Ohio groups hunting elk and moose in the till and lake plain swamps. The notched points of southeastern Ohio were used by economically diffuse hunting and gathering groups (1970:363). While coeval, Blank saw little cultural interaction, suggesting seasonally exclusive occupations of sites where both appeared. He concluded that the Kirk-like complex of southeast Ohio was initiated by and continued to receive direct influences from the Mid-South (cf. 1970:366). The resultant Middle Archaic cultures moved into northwestern Ohio following its abandonment by inflexible Plano peoples. For Blank, although Early-Late Archaic continuity anywhere in Ohio was problematic, in southeast Ohio there was no occupational hiatus. Rather

> ...this apparent gap in cultural chronology results...from our inability to recognize other than a limited number of the cultural elements.
>
> (1970:355-6)

Accepting Blank's thesis, Fitting had argued for a 4,500 year abandonment of northern Ohio until the appearance of a Late Archaic adaptation between 3000 B.C. and 2000 B.C. with the establishment of modern forests. Neither archaeological nor paleoecological data offer support for such a model. Fitting had assumed that the settlement types to be found in northern Ohio fit his Michigan model. Yet, as early as 1966 (cf. Brose and Essenpreis 1973) I argued that the drop of western Lake Erie between 12,000 and 9500 B.P. so altered the relationships of shoreline-interior resource availability that no Great Lakes analogy would apply.

Prufer and Long reviewing the northeastern Ohio Archaic, now suggest that,

> ...it would be wiser to study...the local Archaic as a fluid continuum rather than along the usual tripartite lines of fixed Early, Middle and Late units. This is so because, throughout there seem to have been no variations in life-style patterns from the beginning to the end of the Archaic, at least through the Laurentian tradition.
>
> (1986:50)

Certainly that approach seems required for sites such as McKibben, House or Lukens Hill, intermittently occupied from 7000 B.C. to 3000 B.C., with all diagnostic artifacts in plow-disturbed soils (Prufer and Long 1986:6-10, Table 11). In the absence of intra-site spatial analyses, functional morphological and use-wear studies, or floral or faunal recovery, it is difficult to see how Prufer and Long could escape the impressions that the Archaic artifact inventory was rather static (1986:25) and that the nature of activities carried out at Archaic sites in differing topographic locations could not have been very different (1986:26). However, their tables showing relative frequencies of chipped stone scrapers, bifaces and debitage; ground stone tools, notched and stemmed points; indications of chert heat pre-treatment; and breakage patterns all suggest significant technological differences between these sites. Of course, the extent to which differences may be attributed to site function, as opposed to period(s) of occupation, could not be evaluated from these mixed components. Nonetheless, Prufer and Long saw no discontinuity in Archaic occupation but rather a low population density with a conservative cultural tradition. The sealed and/or stratified sites which might have verified their conjecture remained unpublished, and their report has spurred me to make some known.

Environmental Setting

Regional Paleoecology

South of Lake Erie a zone of proglacial beach formations narrows from Michigan disappearing at Niagara. These deposits lap flat till plains in the west, while in the east they abut the Allegheny Plateau. With the 12,500 B.P. drop of Lake Erie the islands which define the lake's western basin were dry, with a conjoined Thames-Maumee-Sandusky-Cuyahoga River cutting to a shrunken basin off Erie, Pennsylvania (Coakley and Lewis 1985). Tributaries, below former base levels, must have been quite dynamic. The lake effect, which currently buffers seasonal differences between shoreline and interior, could not have existed in the Early and early Middle Archaic. At 9500 B.P. uplift began refilling the western basins, creating biotically rich habitats like those of the 19th century Black Swamp. During much of the Archaic period vegetation represented local mosaics on uplands (now islands). Altered groundwater and effective climate resulted in concentric floristic zones with extensive interfluvial grassland/oak openings with gallery forests. Through time along the lower course of the major rivers there was succession from beech-maple; to mixed-maple; mixed mesophytic; and finally, mixed oak-hickory and elm-ash as lake levels rose.

South of this first zone, old lake beds extend around the old Maumee estuary, thence northeastward with decreasing width to merge with beach formations and disappear west of the Cuyahoga. The zone is marked by rolling topography with numerous kettle lakes and bogs. Most rivers and streams are immature with stable channels and limited biotic diversity, although there must have been changes with the short-term lake fluctuations between 9500 and 6500 B.P.

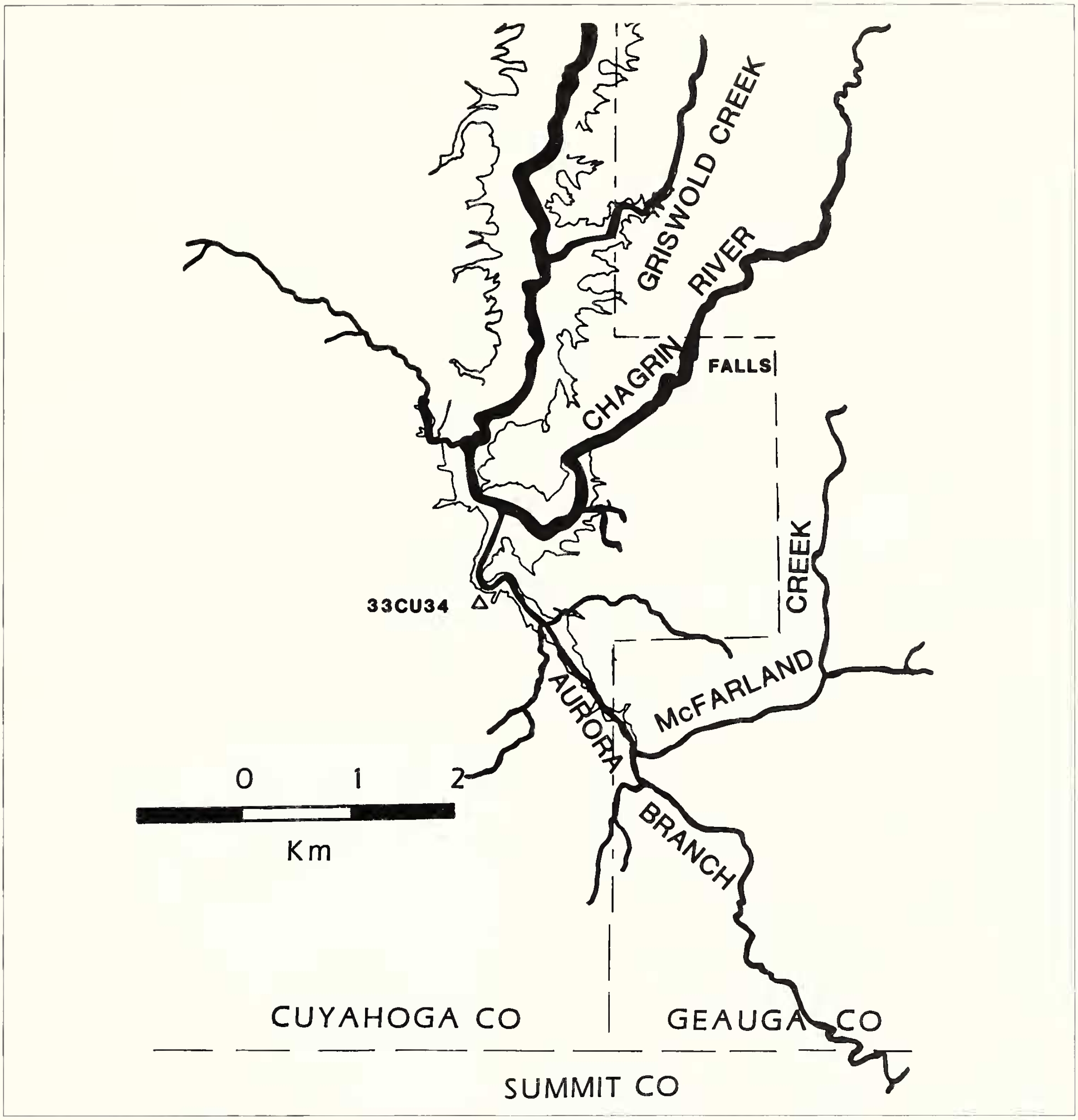

FIGURE 4. *Southeast Cuyahoga County, Ohio, showing Squaw Rockshelter, 33CU34.*

The Glaciated Allegheny Plateau begins south of the lake along the East fork of the Rocky River. The escarpment gradually approaches the modern shoreline, abutting the Lake at Dunkirk, New York. On the plateau (increasingly so to the south) streams slow where they encounter more resistant strata, creating variable valley morphology along short segments, and major differences in tributary frequency and catchments between adjacent systems. Due to altitude, seasonal precipitation differs significantly from other zones. Although exposure creates edaphic communities, flora generally is beech-maple forest on the rolling interfluves, with elm-ash or hemlock valley facies, and mixed tulip-oak-chestnut or oak-hickory-butternut facies on ridges (Williams 1940; Gordon 1969).

Local studies (Potter 1947; Ogden 1966, 1967; Shane 1975) and regional syntheses (Webb, Cushing and Wright 1983; Davis 1983; Hollaway and Bryant 1985) suggest two Holocene periods of major floral change in northeast Ohio. Between 10,000 and 9500 B.P. there was a rapid shift from the short-lived Hudsonian pine/oak forests to the mixed Canadian hardwood/deciduous forests of the Great Lakes; and between 6500 and 4500 B.P. a number of typically

Carolinian species (such as chestnut, walnut, and rhododendron) appeared in the region. The palynological evidence for an early appearance of modern forests, and for the lack of any Hypsithermal prairie development in northeast Ohio, is fully corroborated by faunal evidence indicating a turnover in the period between 11,300 and 9300 B.P. to communities which are essentially modern, with little significant change due to Hypsithermal warming (Semken 1983:193ff).

Holocene Geomorphology

Squaw Rockshelter lies at the southern edge of the Defiance moraine (Goldthwait, White and Forsyth 1967). It sits on the west bank of Aurora Branch, a tributary which joins the Chagrin River 2.5km below the Falls, and 3km above the junction with Griswold Creek (Figure 4). The upper Chagrin above the Falls, and the ower Chagrin below Griswold Creek, flow through large valleys carved into Paleozoic rock, and now filled with fluvio-glacial and lacustrine deposits (Winslow, White, and Webber 1953:41-43). Through these two segments which originally drained south (but not in the intervening section) the river now flows southwest, then north. Earlier Pleistocene drainage (Rau 1969:10-14) was probably controlled by the Ancient Chagrin River whose buried valley, at an elevation between 400' and 500' above mean sea level (AMSL), flowed southward up Aurora Branch (Winslow, White and Webber 1953:41-43, Pl. 3).

During the Wisconsinan stadial, ice overrode the region at least four times. The Woodfordian advance was marked by the Defiance moraine, about 19,000 B.P. This moraine crosses the lower Chagrin valley 2km west of the Falls, just north of the junction with Aurora Branch. The Defiance moraine was subsequently overlain by a veneer of Hiram outwash and till (cf. White 1982). With the melting of Hiram ice, after 14,000 B.P. (White and Totten 1982:48; 1988:66-68), the upper Chagrin River valley drained southwest to the upper Cuyahoga (Wittine 1970). Its channel lay 1500m to the east of present Aurora Branch. Aurora Branch, above the riffles at Solon Road, now flows north-northwest through a buried valley which, during the Altonian interstadial, formed a portion of a stream system which included Griswold Creek and flowed southward into the Upper Cuyahoga, thence south across the present Akron divide to the Tuscarawas River. That portion of Aurora Branch below Solon Road, and the section of the Chagrin River between the Falls and Griswold Creek, were abandoned during much of the late Pleistocene.

Reoccupation of the present Aurora Branch valley, with reversed (north flowing) stream entrenchment and erosion of the Hiram Till which filled it, began when headward erosion of the north flowing lower Chagrin River downcut through the Defiance moraine north of the site and captured the Upper Chagrin River (Feldmann, Coogan and Heimlich 1977:192-193). The hydrostatic event which triggered this erosion was the drop to lowest Lake Erie levels, around 12,500 B.P. (Lewis 1969; Forsyth 1973; Coakley and Lewis 1985). Aurora Branch appears to have downcut to a resistant high of Sharon Conglomerate, and then shifted 1.5km west to reoccupy its present channel during the subsequent low-water period (Feldmann, Coogan and Heimlich 1977:107-142; John Hall, personal communication, 1983-1985).

With a rapid rise in the level of Lake Erie to 495' AMSL, fluvial erosion decelerated by 10,000 B.P., and ended between 7500 and 6000 B.P., with Lake Erie at a stillstand between 538' and 554' AMSL. There appears to have been virtually no downcutting between 5000 and 4300 B.P. when lake levels rose rapidly to ca. 590' AMSL (Coakley and Lewis 1985:198-200, 208-210). After 3900 B.P. there was again a drop to a level controlled by the Niagara Sill at 555' AMSL. With crustal upwarping after 3000 B.P., there was a slow rise to the present level of 572.5' AMSL (Calkin 1970:Table 2). At present the bed of Aurora Branch, where it joins the Chagrin River 2km downstream from the Squaw Rockshelter, is composed of nearly 200' of alluvial deposits with surface elevation of 830' AMSL. Some 20m upstream from Squaw Rockshelter the floor of Aurora Branch is exposed on the upper surface of Bedford Shale (Prosser 1912:529) at an elevation of 854'

Figure 5. *Berea Sandstone roof at Squaw Rockshelter*

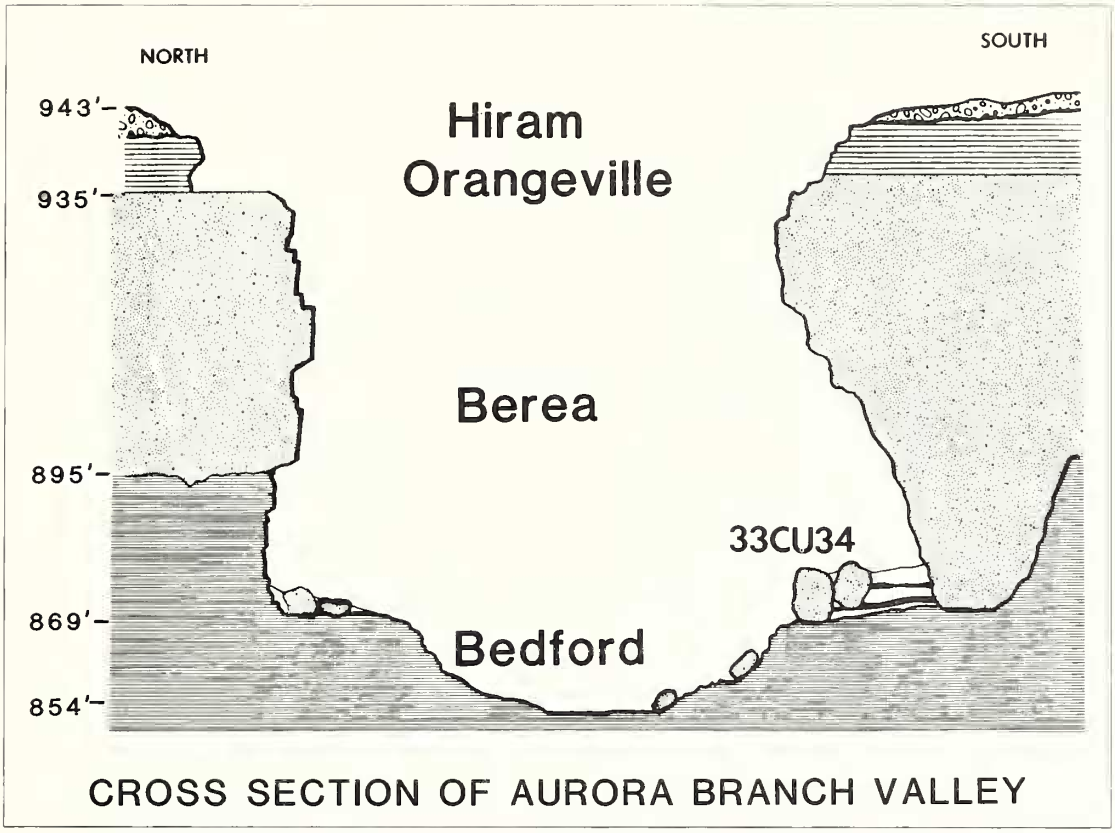

FIGURE 6. *Stratigraphic profile across Aurora Branch at the Squaw Rockshelter site.*

AMSL. Thus, retrenchment of the 3km section of Aurora Branch in which the site is located, was rather rapid. It began after ca. 12,000 B.P. when Lake Erie stood below 440' AMSL. The surface of the old buried southflowing stream in upper Aurora Branch crosses Orange and Solon townships at an elevation just under 500' AMSL (Winslow, White and Webber 1953:42) and thus could not have been tributary to a stream whose surface stood at 500' AMSL, the lowest floor for sediments within the valley of the present Aurora Branch-Chagrin River junction (Rau 1969:figure 2, II; 1, 12, 31-32). That suggests that headward downcutting in the relatively recently captured northflowing Aurora Branch-Chagrin drainage ended before 10,000 B.P. when a relatively rapid rise brought lake Erie to a stand at 523' AMSL (cf. Lewis 1969:276; Coakley and Lewis 1985). While lateral erosion of this segment of Aurora Branch undoubtedly occurred after 10,000 B.P. it must have been at a slower rate than during previous millenia. Indeed, the lower Aurora Branch valley may have been partially re-filled between 4300 B.P. and 3900 B.P. as base level seems to have been higher than present (*ibid.*).

Bedrock Lithology

Squaw Rockshelter formed beneath an overhang of Berea Sandstone, a thick, variably bedded Mississippian sandstone, lying unconformably upon thinly bedded late Devonian shale of the Bedford Formation (Newberry 1870; Bownocker 1915; Prosser 1912). The Berea Sandstone is overlain by thin siltstones and shales of the Sunbury and Aurora submembers of the Orangeville Member of the Mississippian Cuyahoga Formation (Coogan *et al.* 1986). At the site the section forms one of the classic exposures which led to considering Berea Sandstone as a massive deltaic channel fill in the underlying Bedford mudflat shales (Prosser 1912:530-534; Pepper *et al.* 1954:204, pl 5; cf. Coogan *et al.* 1986; however, see Lewis 1988 for an alternative interpretation) (Figure 5).

About 200m southwest of the shelter, Deer Lick Run flows north from a small kettle lake at 943' AMSL, cascading into Aurora Branch 40m downstream of the Shelter. The Orangeville Member here is an 8' to 10' (2.5-3m) thick stratum of thinly bedded, soft argillaceous and grayish-black bituminous shales, interbedded with the layers of blue fine-grained sandstone and siltstones of the Aurora submember. These lie upon Berea Sandstone.

The Berea Sandstone at the site consists of three layers with a total thickness of 42' to 64' (12.7 to 19m). The upper 18' (5.5m) are flat, thinly bedded, ripple marked sandstone composed of medium to medium fine sand grains. Below these lie two or three distinguishable strata of cross-bedded sandstones, with a total thickness of 22' (6.7m). These are composed of medium to coarse sand grains. Below these is a massive stratum of festoon cross-bedded sandstone (Coogan *et al.* 1986:7) composed of medium to medium-fine sand grains, and having a thickness of 23' (7m). This stratum occupies a "channel" deeply cut into the bluish sandy shale of the Bedford Formation (Figure 6). Across Aurora Branch, Berea Sandstone was quarried by the Independent Stone Company beginning somewhere about 1900 (Bownocker 1915). Prior to that the valley was about 35m wide at the top (cf. Newberry 1870).

Stratigraphy and Sedimentology

Analyses

Sedimentological studies were carried out during and after the excavation of Squaw Rockshelter (Appendix). Because Holocene processes operated upon formations with facies displaying considerable variation in short distances, results are less than ideal for understanding deposition during the occupation of the site (cf. Farrand 1985). Under similar circumstances (whatever the actual antiquity of the site) the quartz sand grains at Meadowcroft Rockshelter reflect the primary Paleozoic depositional processes, not the secondary Holocene processes of archaeological interest. Only with great caution (*contra* Donohue 1976) could shelter evolution be reconstructed from studies of sediment derived with little transport from variable sandstones such as the Berea Sandstone at Squaw Rockshelter or the Connellsville Sandstone at Meadowcroft. At Squaw Rockshelter profile inspection of *in situ* sediments and subsequent analyses distinguished five strata (Appendix).

Stratum 1

This lowest unconsolidated post-incision fill of the shelter represents water-sorted Hiram till, deposited along the undercut wall of Aurora Branch. Samples A1 and B1 both consisted of poorly sorted and poorly consolidated lenses of dark yellowish brown (10YR 4/6) to greenish gray (5GY 5/1) fine sandy loam and silt loam with sub-angular flat lying cobbles of greenish-gray to dark bluish-gray shale, and small angular to sub-angular cobbles of reddish-yellow to dark grayish-brown stratified sandstone. These samples lay conformably upon and graded into the underlying sediment (Ao), at depths below datum of 140cm and 135cm, respectively. There is a relative decrease in very fine silt to clay-sized particles to the rear of the deposit, suggesting some low energy groundwater movement along the rear wall. No bedding differences could be noted across what seems to be this same level in those excavation units where it could be identified (XU 1, 5, 3, 5, and the excavation at the north end of the deposit), although there were fewer cobbles and finer sediments in higher levels.

Stratum 2

These deposits, encountered at 110cm and 125cm below datum consisted of a very compact lens of dark grayish brown (10YR4/2) to dark strong brown (4.5YR 4/6) medium to coarse sandy loam flecked with granules of charcoal, and lying conformably upon the underlying silt loam and inclusive cobbles. This lens, which ranged from 10cm in thickness at the front of excavation Unit 3, to 20cm in thickness at the back of Excavation Unit 5, was virtually free of inclusive cobbles. As identified lithologically it occurred in all areas of the site except for the eastern halves of Excavation Units 2 and 4 and the excavation where recent erosion appears to have removed it. Within Excavation Units 1, 3, and 5, where continuous stratigraphic exposures could be observed, the upper 5 to 10cm of the deposit contained small areas with thin laminae of yellowish brown (10YR 5/4) or light grayish brown (10YR 2/4) fine silts and clays. These laminae were more common to the south. Horizontally lying flint tools and chipping debris were encountered throughout this lens. Within the lowest and thickest portion of this deposit running about 160cm along the southern wall of Excavation Units 1 and 5, 115cm below the datum, human skeletal remains were encountered within a thin zone (Feature 2) 30cm wide. This stratum appears to represent at least the basal portions of an anthropic epipedon. The relative removal of silts and clays, the horizontal placement of larger (cultural) particles, the few finer laminar facies within this deposit, which parallel the overall westward dip toward the rear wall and strike to the north, all suggest that this level represents some portion of a surface in part deposited by gravity, minimally altered by prehistoric occupation, and then significantly reworked by low energy water transport. In Excavation Unit 4, at a depth below site datum of 120cm, a concentrated lens of oak charcoal associated with the midsection and tip of a lanceolate point, yielded a radiocarbon date of 9480±160 B.P. (DIC-586). This stratum is called Cultural Level II.

Stratum 3

This is an unconsolidated zone of numerous large angular cobbles and boulders of cross-bedded Berea Sandstone within a matrix of fine to very fine sands. Encountered in all excavation units between 95cm and 110cm below datum, this stratum was about 45cm thick at the front of the shelter and about 65cm deep along the rear wall and lay conformably upon Stratum 2. Stratum 3 appears to represent in place chemical weathering of material derived by mechanical processes from the massive Berea Sandstone "channel fill" which forms the present back shelter wall and which must have formed the shelter overhang during the deposition of Stratum 2. The massive blocks of cross-bedded Berea Sandstone which presently lie between these unconsolidated deposits and the Aurora Branch, seem to lie directly upon Stratum 2. Where recent rodent disturbance has not confused subsequent depositional sequences (in XU 1 and 3), Stratum 3 appears to have been deposited between these blocks and the rear wall of the shelter.

Stratum 4

This deposit lies conformably on the surface of Stratum 3. It is a 15cm to 25cm deep zone of yellowish brown (10YR 5/4) medium to coarse loamy sands including relatively few pebbles or small cobbles. Large cobbles of massive unbedded Berea Sandstone occurred throughout the stratum, however, and while portions of stratum 4 were encountered at depths between 55cm and 70cm below datum in every excavation unit except the northern test trench, it was not possible to trace this deposit continuously for distances greater than 80cm in any direction. Indeed the correlation of Stratum 4 in excavation units 1, 5, and 3 and in Excavation Units 2 and 4 is a conjecture largely based upon similar granulometric analysis and relative stratigraphy. Although no vertical sorting or pedogenic structures of any sort could be identified in Stratum 4, there was some clear front-to-back sorting with coarser sands at the front. Several very shallow cultural features were encountered within this stratum, and their origins varied in surface elevation by as much as 20cm. The most unambiguous of these, Feature 3, encountered at a depth of 70cm below datum in XU 2, consisted of a shallow oblate depressed area of fire reddened (2.5YR 3/5) silty clays about 25cm by 20cm in surface area and about 5cm thick. This 'hearth', located about 45cm from the rear shelter wall, was about 10cm deeper in the center than at the periphery. The base of the center rested on a block of sandstone buried in Stratum 3. Within this depressed central area a matrix of dark yellowish brown (10YR 5/4) to dark grayish brown (10 YR 4/2) silty loam contained small flakes of chert, charcoal identified as maple, and a small charred fragment of walnut hull. The wood charcoal fragments yielded a radiocarbon date of 5500±85 B.P. (DIC-321). Between this feature and the rear wall, at slightly shallower depths, were two discontinuous horizontal areas of more compact and darker (10YR 3/2) silty sands, each about 10cm thick. These zones yielded several lithic tools and flakes and a single fragment of charred cordage. A second possible hearth, Feature 1, was encountered at the northern edge of Excavation Unit 1 between 75cm and 85cm below datum. No fire-reddened subsoil was noted, but a lens of sandy ash (pH 6.0) filled the central portion of this circular clayey lens, some 30cm across. Between the northern periphery of Feature 1 and the block of fallen sandstone fronting the river, were loose sandy silts riddled with recent rodent burrows. The feature contained no organic material, although an expanding stemmed projectile point was recovered from the compact silts at the southeastern edge of the feature. Several other formal lithic tools and as well as lithic debitage were recovered from this stratum in excavation units 2, 3, and 5, but no other cultural features and no other areas of apparent concentration were found. Stratum 4 is called Cultural Level I.

Stratum 5

This stratum rests unconformably upon the surface of Stratum 4 with a clear contact. Many of the upper surfaces of the large cobbles and blocks of Stratum 4 (and several of those which obtrude from Stratum 3 through Stratum 4) are incorporated into the lower portions of this 40cm to 60cm thick zone of dark grayish brown (10YR 4/2) to dark yellowish brown (10YR 3/2) sandy loam and sandy clay loam. Large cobbles of Berea Sandstone and pebbles and small cobbles of siltstone from the overlying Orangeville member are entirely incorporated in this matrix. At the time of excavation the surface of this stratum in Excavation Unit 2, 3, and 5 was capped by a 20cm to 35cm thick zone of decomposing organic material (leaf litter, dead rodents, cigarette filters) and some amount of very recent inorganic trash. Humic acid staining from this Ao horizon had penetrated to variable depths within the upper 20cm of Stratum 5, but no soil development had occurred (cf. U.S.D.A. 1977).

During the accumulation of at least the lower portion of Stratum 5 sediments apparently weathered from some portions of the Orangeville Member and perhaps even some weathered from Hiram Till were being introduced to the front of the shelter by a higher energy transport medium. This situation seems to have ceased during the period in which the upper portions of the stratum were deposited. While unconfirmed by stratigraphic excavation, it is possible that the large foreset-bedded Berea Sandstone block presently forming the southeast wall of Excavation Unit 4 fell onto lower Stratum 5 during this depositional episode. Unfortunately, the area along that face of the Excavation Unit 4 block and the entire stratigraphic sequence above Stratum 3 were represented by rodent disturbed deposits (Sample X). All cultural materials encountered within Stratum 5, whether prehistoric or recent, were recovered from such rodent-disturbed areas in Excavation Units 1, 3, and 4. The presence of mid-20th century material in these areas suggests that their absence on the surface of Stratum 5 is due to Metropark cleaning efforts since the 1960's.

Summary

Most non-cultural sediment within the site is attributed to the in-place deposition of sands and silts chemically and mechanically weathered from bedrock. There was sheet runoff in portions of the shelter, and with the exception of a short period around 5500 B.P. the net effect of water transport after 10,000 B.P. appears to have been erosive. Sedimentological analysis and the vertical and horizontal stratigraphy within and downstream from the shelter suggest three relatively distinct episodes of human occupation of variable intensity and importance. Squaw Rockshelter appears to have been relatively deep when occupied about 9200 B.P. The shelter was more exposed when occupied around 5500 B.P. Finally, the

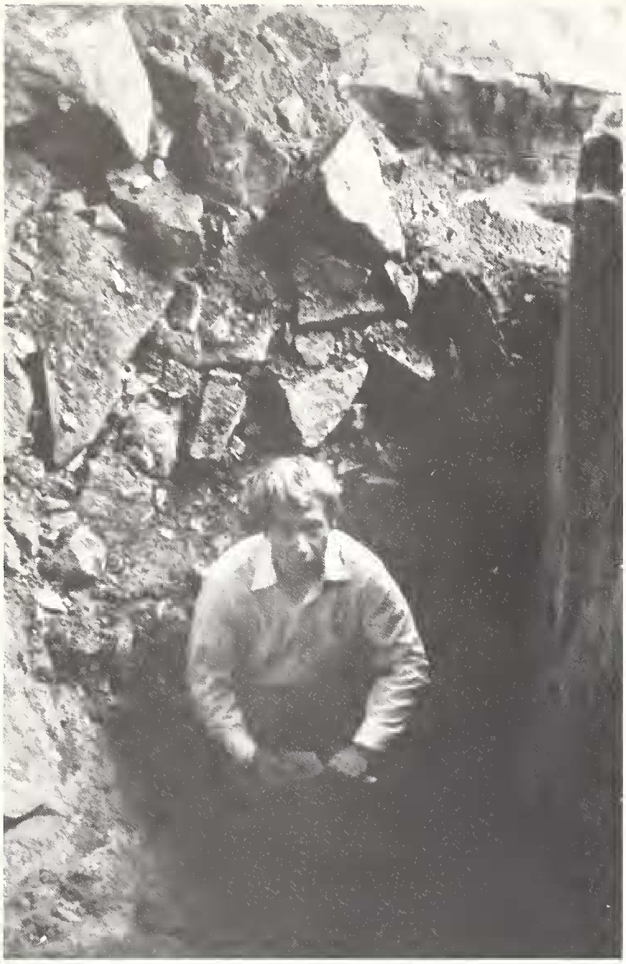

FIGURE 7. *Excavation of Unit 5 showing limits of space.*

barely protected surface of shelter deposits has been used intermittently during past decades. Evidence for anthropic episol formation appears only in discontinuous portions of Cultural Level II, and at the top of Stratum 5 postdating aboriginal use.

Archaeological Recovery

Methods

Rockfall made shovelling impossible within the confines of excavation units (Figure 7). All sediments were removed by hand and trowel. When a distinct stratum surface was encountered the contact was cleaned across the floor of the excavation unit. Large fallen blocks often made this procedure difficult to follow. After their non-cultural origins had been confirmed, there was no screening of strata 5, 3, or 1. Although all feature matrix and fill was screened through 3/32" mesh, fine screening of cultural "floors" was not systematic. No flotation samples *per se* were collected at the site, but flotation was undertaken on each soil sample collected. These methods yielded fragmentary and complete mollusk shells and minute fragments of wood charcoal. No pollen was preserved in any of the sediments inspected, and no attempt to identify phytoliths was made. Overall, fine screening and flotation yielded little independent data on the proximal environment of Squaw Rockshelter when Cultural Level II (9480±160 B.P.) and Cultural Level I (5500±85 B.P.) sediments accumulated.

Mollusks

Analysis of recovered mollusks was performed by Brose in 1984. A total of 36 identifiable gastropods and 61

TABLE 2

IDENTIFIABLE MOLLUSCS RECOVERED FROM SQUAW ROCKSHELTER

	Cultural Level I	Cultural Level II
Aquatic Gastropods	N (% class)	N (% class)
Valvata tricarinata (Say)	2 (15.4)	•
Stagnicola sp.	6 (46)	1 (50)
S. reflexa (Binney)	3 (23)	•
Helisoma sp.	2 (15.4)	1 (50)
Subtotal	**13 (99.8)**	**2 (100)**
Terrestrial Gastropods		
Stenotrema fraternum	4 (17.4)	3 (33.3)
Triodopsis albolabris	8 (34.8)	1 (11.1)
Zonitoides arboreus	6 (26.1)	1 (11.1)
Discus cronkhitie	5 (21.7)	4 (44.4)
Subtotal	**23 (100)**	**9 (99.9)**
TOTAL	36	11

Table 3

Charcoal Fragments Recovered from Squaw Rockshelter

	Cultural Level I	Cultural Level II
Genus	N (% ID)	N (% ID)
Pinus	5 (9.6)	10 (23.3)
Tsuga	16 (30.8)	8 (18.6)
Acer	10 (19.2)	8 (18.6)
Quergus	5 (9.6)	17 (39.5)
Fagus	8 (15.4)	0 (•)
Ulmus	5 (9.6)	0 (•)
Jugulans	3* (5.8)	0 (•)
Total Identified	52 (100)	43 (99)
Unidentifiable	21	31
TOTAL	73	74

* 2 fragments of charcoal and 1 charred nut shell fragment

unidentifiable fragments was recovered from Cultural Level I, while 11 identifiable gastropods and 27 unidentifiable fragments were recovered from Cultural Level II sediments (Table 2). No bivalves were recovered, suggesting that all mollusks present were due to non-cultural factors. Even standardized for the relative volumes of sediment analyzed from Cultural Level II (.94m^3) and Cultural Level I (1.75m^3) it is clear that there was a somewhat greater frequency of gastropods of all types in Cultural Level I than in Level II, and there was a significantly greater frequency of aquatic gastropods in Level II.

There are few environmental differences among the recovered aquatic gastropods. All are extant and have inhabited the region since the mid-Pleistocene, living on emergent vegetation in a wide range of energy environments (LaRoque 1968:367-506). The relative paucity of Cultural Level I aquatic gastropods is consistent with sediment analyses suggesting little flooding of the shelter during its early history.

Differences in overall frequencies of the terrestrial gastropods from the two cultural levels reflect both the relative loss of shelter overhang during the millennia between depositional events, and the greater duration of Level I sediment accumulation. Differences suggested by the habitat preferences of the 47 terrestrial gastropods must be tempered by small sample sizes, the unsystematic recovery strategy, and by the assumption that for over 4,000 years the shelter represented a varying taphonomic catchment. Ignoring these caveats, the shift from an assemblage of *Stenotrema fraternum* and *Discus cronkhitei* to an assemblage dominated by *Triodopsis albolabris* and *Zontoides arboreus* reflects the change from cool damp hardwood/conifer Canadian forests to forests in which beech-maple and mixed Carolinian mesophytic hardwoods predominated. However, all of these species are extant locally and have been present since pre-Wisconsinan time (LaRoque 1968:570-680).

Charcoal

Fragments of charcoal and charred nut hull (Table 3) recovered from Squaw Rockshelter were identified in 1976 by Dr. F. DiMarinis, Cleveland State University Biology Department. None of the uncharred seeds or nut hulls recovered from potentially rodent disturbed soils (x) were included in these analyses. Assuming these specimens have been humanly introduced to the shelter, each assemblage represents a mixture of local availability and cultural selectivity. The absence of walnut and beech in level II is predictable, since neither were present in northeast Ohio at 9500 B.P. (Webb *et al.* 1983:154-157; Davis 1983:173). Elm, however, should have been even more common than at present and its absence from Level II samples may be due to the fact that deadfall of prefered species was more easily obtained. Hemlock is presently a common species in the Chagrin River valley ravines (Williams 1940:19-23) and apparently has been for millennia. Other significant differences between the assemblages, from one dominated by oak and pine at 9500 B.P. to one of beech and maple at 5500 B.P. may reflect general environmental availability rather than shifts in cultural preference.

The fragment of charred walnut hull from Level I is a poor seasonal indicator, walnuts in the hull being storable for several seasons. Certainly, plants yielding fruits widely utilized throughout the prehistoric record existed in the proximity of the shelter, so that the lack of other charred seeds could be considered at least seasonally indicative had the recovery methods been more thorough.

FIGURE 8. *Fragment of charred cordage from Cultural level I.*

Charred Cordage

A single piece of knotted cordage was recovered during the excavation of Excavation Unit 4. Within the sandy Stratum 4, at a depth of 70cm, Feature 3 consisted of a shallow fire reddened silty clay hearth 25cm in diameter and 5cm thick. Between this hearth which contained flakes of chert and charcoal dated to 5500±85 B.P., and the rear shelter wall 45cm south, slightly shallower compact dark silty sands 10cm thick yielded several lithic tools and flakes and a single fragment of charred cordage. The cordage, analyzed by Drs. Andrews and Adavasio (this volume), consists of a single fragment of spun and twisted plant fibers knotted at both ends. It may have been a knotted clothing fringe, a bundle of construction material, or a part of a snare or trap (Figure 8).

Human Skeletal Material

From the lowest portion of Stratum 2, running for 160cm along the southern wall of Excavation Units 1 and 5 at a depth of 115cm, fragmentary remains representing at least two individuals were recovered within a thin zone (Feature 2) 30cm wide. The stratum is a dark brown sandy loam flecked with granules of charcoal dating to 9200±150 B.P. Feature 2 within this stratum was from 10 to 20cm thick at the back of Excavation Units 1, 3, and 5, and contained small areas with thin laminae of yellowish or light grayish-brown fine silts and clays. These laminae parallel the rear wall of the shelter and represent a surface reworked by low energy water transport, perhaps seasonally. Based upon the analyses (Prior, this volume) the majority of the material is from a young adult female, additional individuals being represented by three isolated teeth not in association. Unfortunately, while adding to a limited data base (Protsch 1977), the skeletal material does not allow much comparision of Early Archaic regional demography or morphology possible at other

TABLE 4

COMBINED SQUAW ROCKSHELTER DEBITAGE CATEGORIES
CULTURAL LEVEL II

	Used	Unused	Total
Block Cores			
Upper Mercer	•	2 (1)	2 (1)
Plum Run	•	2 (2)	2 (2)
Glacial	•	•	•
Pebble Cores			
Glacial	•	1	1
Decortication Flakes			
Upper Mercer	•	•	•
Plum Run	•	•	•
Glacial	4 (2)	9 (3)	13 (5)
Block Shatter			
Upper Mercer	•	4 (3)	4 (3)
Plum Run	1 (1)	5 (4)	6 (5)
Glacial	2	3 (2)	5 (2)
Thinning/Retouch Flakes			
Upper Mercer	5(3)	3 (3)	8 (6)
Plum Run	1 (1)	8 (8)	9 (9)
Glacial	2 (1)	4 (1)	6 (2)
Subtotals			
Upper Mercer	5 (3)	9 (7)	14 (10)
Plum Run	2 (2)	15 (14)	17 (16)
Glacial	8 (3)	17 (6)	25 (9)
TOTAL	15 (8)	41 (27)	56 (35)

sites (*e.g.* Charles and Buikstra 1983; Redder 1985; Dickel and Doran 1988).

Chipped Stone

During the excavation of the shelter 168 pieces of debitage were recovered. Application of several distributional analyses (cf. Brose and Scarry 1977), adjusted for volume of sediment from each excavation unit, does not indicate statistically significant clustering. No doubt, more rigorous analyses (Vance 1987:59) would suggest otherwise, but the waterworked surfaces of Cultural Level II, the longer but unknown erosional processes during the formation of Cultural Level I, and the large size of most debitage recovered, argue that concentrations would be lag deposits, geological rather than cultural in origin. Those processes urge caution in any attempt to reconstruct not only spatial but technological aspects of lithic reduction during either period of occupation. The distribution for each cultural level (Tables 4 and 5) is presented in terms of debitage categories as stages in the manufacturing trajectory (Brose 1970:97-106, 1978; Prufer and Long 1986:42-44). Analyses of debitage weight and surface area reveal that debris from all stages of biface reduction and use are present in both occupations (Stahle and Dunn 1984:4-9). In that sense, the Early Archaic lithic procurement and reduction is similar to the Kirk occupation at the Calloway Island site (Chapman 1979:36-62).

Identification of lithic sources was primarily visual, although petrographic analyses confirm some attributions. The nearest outcrops of the black Upper Mercer flint lie 55km east, along the Portage/Trumbull County line (Prufer and Long 1986:18). The mottled orange to greyish-blue Plum Run flint is from a small quarry 70km south in Stark County (Murphy and Blank 1970: 198). Glacial flints are mostly brownish-grey, dark grey, and mottled blue-grey Palaeozoic cherts of the Niagaran formations in Ontario (Parkins 1977), present in local stream gravels throughout glaciated portions of Ohio (Brose *et al.*1981). Heat treatment was identified by the presence of texture and color changes, as well as by "pot-lid" fractures underlying primary flaking scars.

Utilization of debitage edges for expedient tools was determined by low powered opaque microscopic observation, following methods described by Frison (1968), Brose (1970, 1975, 1978), Tringham *et al.* (1974) and Keeley (1980). Although no significant changes in knapping chipped stone can be demonstrated within Squaw Rockshelter, procurement and reduction differed between levels. There is a small, but statistically significant increase

Table 5

Combined Squaw Rockshelter Debitage Categories
Cultural Level I
(Number showing heat-treatment)

	Used	Unused	Total
Block Cores			
Upper Mercer	•	3 (1)	3 (1)
Plum Run	2 (1)	3 (2)	5 (3)
Glacial	•	•	•
Pebble Cores			
Glacial	•	4	4
Decortication Flakes			
Glacial	6 (2)	8 (4)	14 (6)
Block Shatter			
Upper Mercer	1 (1)	7 (5)	8 (6)
Plum Run	5 (2)	12 (8)	17 (10)
Glacial	8 (2)	11 (6)	19 (8)
Thinning/Retouch Flakes			
Upper Mercer	4 (4)	7 (5)	11 (9)
Plum Run	1 (1)	8 (7)	9 (8)
Glacial	7 (1)	15 (5)	22 (6)
Subtotals			
Upper Mercer	5 (5)	17 (11)	22 (16)
Plum Run	8 (4)	23 (17)	31 (21)
Glacial	21 (5)	38 (15)	59 (20)
TOTAL	34 (14)	78 (43)	112 (57)

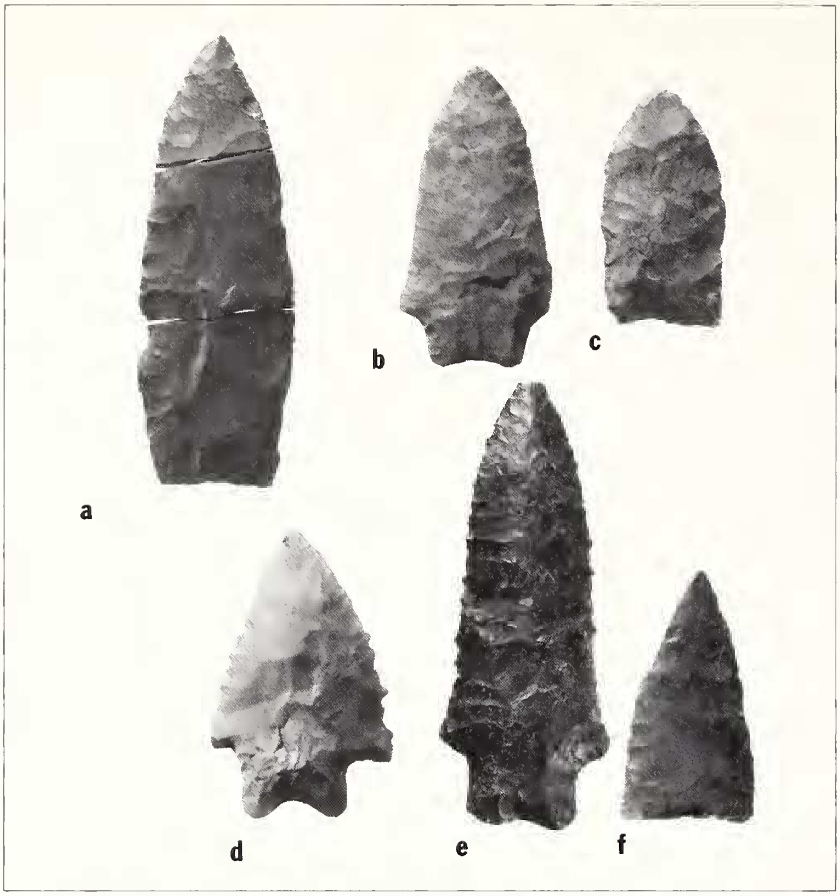

FIGURE 9. *Projectile points from Cultural Level II. See Table 6 for sizes.*

in the frequency of the more local of the three sources of raw material used from the Early Archaic (9500 B.P.) to the late Middle Archaic (5500 B.P.). The Plum Run quarry was initially favored over the closer Upper Mercer outcrops, possibly because the former source displays thicker bedding. Through time, however, there was a greater utilization of the local glacial cherts for the production of expedient tools. This localization of procurement is related to the highly significant decrease in heat treatment in utilized and unutilized debitage. In the earlier period almost all Plum Run flint was heated, while in the later period only one third was. A rough index, comparing initial reduction stage decortication flakes and block shatter, to final reduction stage thinning flakes, suggests little change over four millennia. However, it is unlikely that all areas of a rockshelter would have been equally attractive for performing different aspects of flint knapping. Expedient tool use was more likely to have taken place in the well-lighted shelter opening, while curated tool loss was more likely to have occured in the darker rear areas of the shelter. Most frontal portions of Level II had been lost to erosion before Level I formed so that if similar portions of the shelter were used for rather similar activities differing segments of the production sequence could be recovered from sequent levels in a single unit, even if overall reduction strategies were similar. Gramley (1980) discussed site function in terms of a curatorial index, comparing ratios of bifaces and formal tools to the ratios of expedient tools and utilized flakes. Fitting (1967) had used a similar index to infer group sexual composition. Clearly, the interaction of site function and demography is responsible for the fact that at Squaw Rockshelter 40% of lithic artifacts in the Early Archaic Level II were curated, while only 20% were in late Middle Archaic Level I.

Beyond the utilized debitage, 28 formally produced tools were recovered from the shelter. Not every provenience from the site is unimpeachable, and even though there is stratigraphic separation between cultural levels, neither demonstrate the internal integrity needed for satisfactory social interpretations. Nonetheless, these examples of local style and technology can be compared to coeval assemblages in other regions to illuminate the Early and Middle Archaic occupations in northeast Ohio. Indeed, the bifacial projectile points from the Early Archaic level are evidence for the interaction of cultural patterns hitherto isolated in Ohio, with exceptions so infrequent their very existence had been questioned.

TABLE 6

PROJECTILE POINTS FROM SQUAW ROCKSHELTER (33CU34) CUYAHOGA CO., OHIO, LEVEL II
(IN MILLIMETERS)

CMNH Cat. No.	Length	Width	Thickness	Tang to Base	Basal Width	Haft Width	Haft Length	Base Indent	Comments
8049A1	88.9	31.2	8.5	•	22.4	22.4	•	1.1	Test Unit 3, Level II. Moderate to heavy grinding of lower 15.9mm both edges. Base not ground. Three thinning flakes removed from obverse. Found in three areas along back of shelter. Upper Mercer flint. Figure 9a.
8047D	73.8	42.0	15.8	21.3	18.2	19.7	9.8	1.9	Test Unit 3, Level I(II). *Area of rodent disturbance* near front block. Obverse face shows multiple flakes from base. Basal edges heavily ground below tang and along base. Plum Run flint. Figure 9b.
8049A2	47.2	25.0	8.4	•	22.8	22.7	•	3.1	Test Unit 3, Level II. Moderate grinding on base and lower 16mm both edges. Numerous small thinning flakes removed from both basal faces. Glacial chert similar to Bois Blanc. Figure 9c.
8047C	69.2	42.6	7.2	17.2	25.8	22.3	11.0	5.2	Test Unit 1, Level II. Unworn serrated lateral edges; no evidence for use. Basal tangs and stem are heavily ground. Heat-treated Plum Run flint. Figure 9d.
8046B	84.3	41.5	8.2	18.1	26.8	23.3	12.0	4.8	Test Unit 2, Level II. Edges heavily ground below tangs. Considerable gloss along medial ridge on both faces. Single basal thinning flake removed from both faces. Upper Mercer flint. Figure 9e.
8048D	47.7at break	23.8	5.8	N/A	24.8 at break	N/A	N/A	N/A	Test Unit 4, Level II. Found in gully at base of shelter. Top heavily battered and glossed. Break appears due to shock. Glacial (Onondaga) chert. Figure 9f.

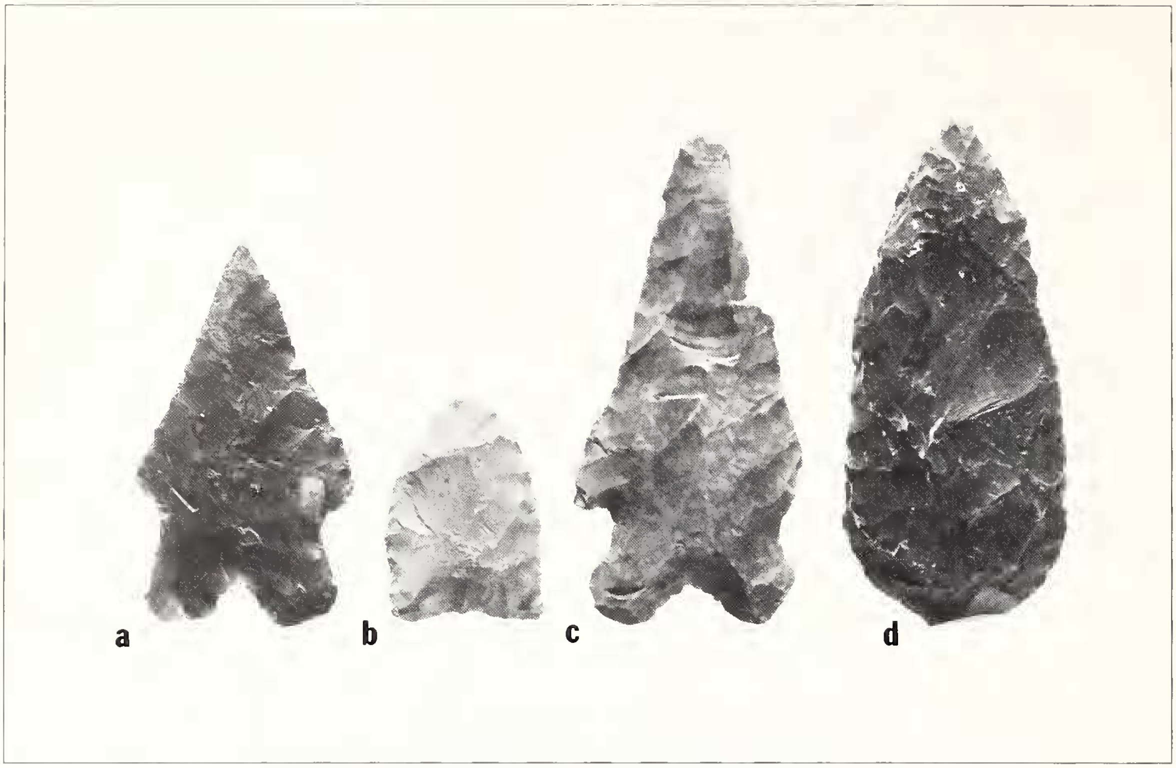

FIGURE 10. *Projectile points recovered from erosional surfaces.*

Level II

From Cultural Level II there were one distal half and five complete bifacial projectile points; three bifacial scrapers, one of which had a graver tip; three unifacial scrapers; a drill tip; a bifacial blade; and a bipolar core wedge. Three additional bifacial projectile points and an ovate bifacial blank came from secondary contexts and cannot with certainty be assigned to either of the cultural levels encountered in the excavation. However, their matrix strongly suggests they were derived from the lowest cultural strata, an assignment in keeping with the style and technology they display.

Two lanceolate points excavated within the shelter (CMNH #8049A1, and #8049A2: Table 6), as well as one lanceolate point recovered in secondary deposits (CMNH #8079A: Table 7), represent variants of Steubenville Lanceolate Points (Mayer-Oakes 1955, Ritchie 1971: Pl. 29). The two shorter examples are similar to what, in the upper Great Lakes, have been called Plainview, although Mason (1981) includes longer examples under that type, and Ritzenthaler (1975:17) called longer examples Browns Valley/Plainview. In Iowa similar points of a wide variety of cherts were recovered from horizons of the Cherokee Sewer site dated between 7480±100 and 8750±200 B.P. (Anderson 1980: 197-238). In northeast Ohio Prufer (1963) describes longer examples from the McConnell site as Stage 4 Lanceolate points. Examples identical to the shorter lanceolates from Squaw Rockshelter are assigned to the Late Paleo Group 2 at the McKibben site (Prufer and Sofsky 1965:16-17), and one similar Steubenville Lanceolate point is reported at Meadowcroft from some portion of a cultural level associated with dates between 8018±110 or 9115±115 and 11300±700 B.P. (Carlisle and Adovasio 1982:175,183). Coe illustrated a similar Early Archaic Hardaway Blade from North Carolina (1964:64, fig. 56a).

One bifurcate-based point excavated within the shelter (CMNH #8047C: Table 6) and two bifurcate-based points from secondary deposits (CMNH #8079B and TAB: Table 7) are variants of St. Albans Side-Notched points. The two non-shelter points resemble St. Albans Side-Notched Variety A (Broyles 1971:72-73) and Variety B (Broyles 1971:74-75, fig. 26), respectively. Both are similar to what Chapman (1977) calls Category 22: McCorkle Side-Notched points. The St. Albans Side-Notched point from within the shelter resembles Chapman's Categories 13-15: Stanley Cluster points. Similar points, widespread in this region (Fitting 1964), have been recovered from the Kirk-Palmer zone at the C.S. Lewis site (Anderson and Hansen 1987:fig. 9, row 3). To the north Kirk cluster (large variety) points associated with lanceolate plano points are reported from Ontario at ca. 8900 B.P. (Ellis and Deller 1986:56; Fox 1980), while both St. Albans varieties, almost invariably made on Upper Mercer chert, have been recovered from a number of southern Ontario sites (Storck 1978). Further northeast, similar bifurcate-based stemmed points were excavated from what may have been a burial pit dated 9085±200 B.P. (SI-2638) at the Harrisena site near Lake George (Snow 1977:235-238).

TABLE 7

LITHIC MATERIAL FROM SQUAW ROCKSHELTER (33CU34) CUYAHOGA CO., OHIO: SURFACE DEPOSITS (IN MILLIMETERS)

CMNH Cat. No.	Length	Width	Thickness	Tang to Base	Basal Width	Haft Width	Haft Length	Base Indent	Comments
Thomas B. Collection	63.2	39.6	6.8	18.3	23.6	22.0	12.5	3.8	Blade edges somewhat serrated and display no evidence of wear. Final blade edges retouch from left only. Upper Mercer flint. Figure 10a.
8079C	30.9	20.8	8.0	N/A	20.8	20.8	N/A	1.5	Blade edges display crushed and worn flake scar ridges. Much gloss on medial ridges on both faces; no striations. Numerous basal thinning flakes removed from both surfaces. Basal grinding. Glacial chert similar to Bois Blanc. Figure 10b.
8079B	65.9	30.9	18.5	15.8	27.6	22.3	13.0	4.5	Intact blade edge shows serrated appearance. No crushing of edge. Few oblique striations along both edges on both faces. Final retouch from left. Heavy grinding of base and lateral haft edges. Plum Run flint. Figure 10c.
8079A	77.2	38.9	18.5	N/A	N/A	N/A	N/A	N/A	No grinding of edges. Upper Mercer flint. Figure 10d.

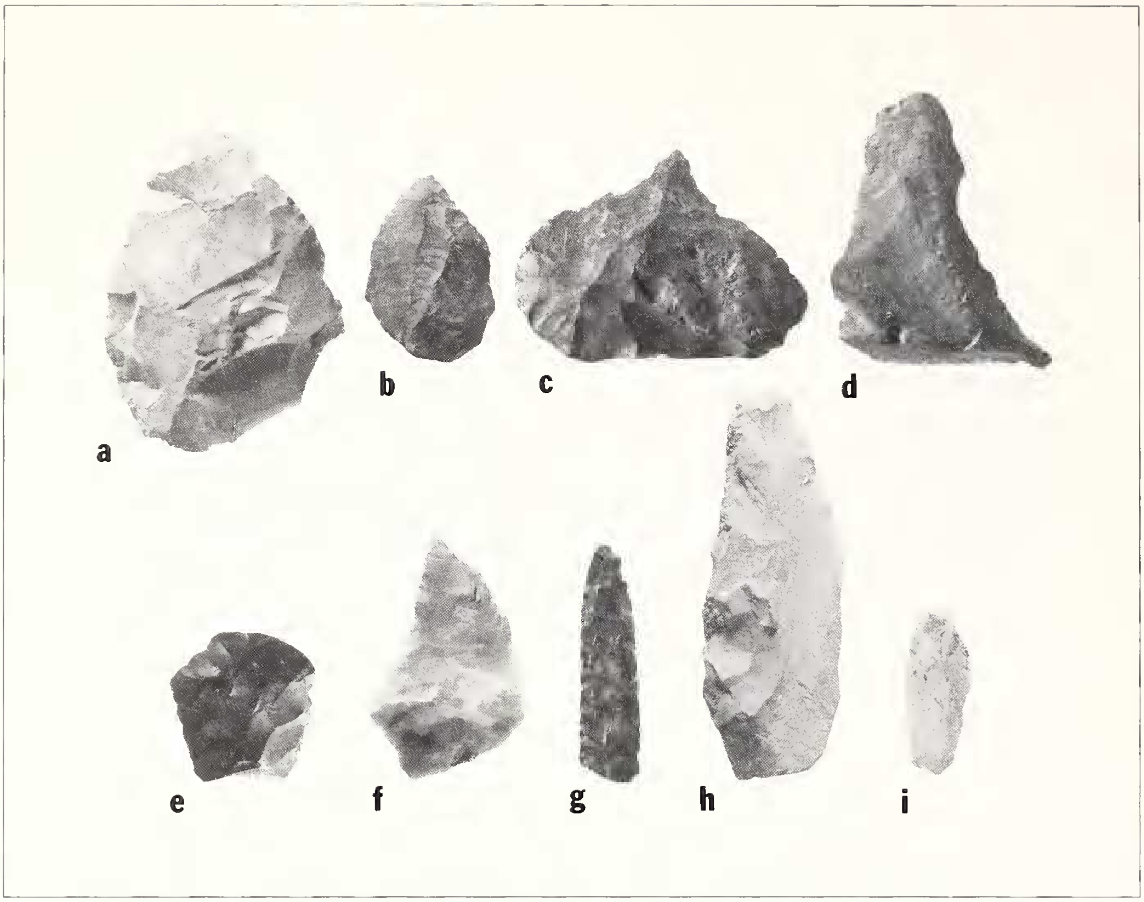

FIGURE 11. *Miscellaneous lithic artifacts recovered from Cultural Level II. See Table 8 for sizes.*

Two indented-stem based points excavated within the shelter (CMNH #8047D, #8046B: Table 6) are variants of what Coe (1964:35, fig. 60c) and Broyles (1971:66-67, fig. 26) call Kirk Stemmed. Similar points have also been described as reworked Stanley Stemmed (Coe 1964:35, fig. 31) or reworked McCorkle Stemmed (Broyles 1971, fig. 26) points. Chapman (1977) describes these points as Category 14 or 15: Stanley or early Stanley points. Similar points are called Kirk-Palmer variants at the C.S. Lewis site (Anderson and Hansen 1987, fig. 7k, 9) or Palmer Varients at Rucker's Bottom site, in the Savannah River valley (Schuldenrein and Anderson 1985). Although it is unclear how they differ from some Kirk Stemmed points, McKenzie's (1967:38-39, fig. 3) Drake Indented-Base points occur from the Scioto valley to Lake Erie. His attribution of this type to a late Middle Archaic phase is certainly questionable. In Canada similar points occur at the Early Archaic Heaman Area II of the Thedford 1 site in Ontario (Ellis and Deller 1986:46-47). Ellis (1987:21) called these Stanly/Neville points, after Dincauze (1976) but shorter versions of the same type across southwest Ontario (Deller 1976:16, K.4 and K.12) and about the western end of Lake Erie (Payne 1982: 25, fig. 11d-h) have been called unusual examples of late PaleoIndian HiLo points. A rather similar series of projectile points were recovered from the thin Kirk phase horizon at the Sheep Rock shelter in south-central Pennsylvania, bracketed by dates of 9800 and 7000 B.P. (Michels and Smith 1967). In New York similar forms, considered transitional to Middle Archaic Genessee points (Ritchie 1971:pl.10, fig. 2) are undated.

A broken biface tip from Level II (CMNH #8048D: Table 6) has the same cross-section as does the long lanceolate point from the same deposit. It has a burinated tip, but there is no indication of use as a burin. The unfinished ovate biface from the surface deposits which yielded the other presumably Early Archaic points (CMNH #8079A: Table 10) duplicates Prufer's (1963) McConnell Stage 2, or the Heaman Area A bifaces (Ellis and Deller 1986: fig. 5a).

Level II of the Squaw Rockshelter yielded a small assemblage of less chronologically diagnostic formal tools (Table 8). Most appear to duplicate the manufacturing technology and the morphology of single purpose tools. Yet, to some extent, all seem to have functioned for a variety of tasks (Tringham *et al.* 1974; Brose 1975; Keeley 1980). The scrapers and drill fragment were made of the same suite of chert types represented by the points and the debitage. The single bipolar core fragment (CMNH #8049E) appears to have been manufactured from a pebble of quartzite, common in the nearby Sharon Conglomerate.

TABLE 8

MISCELLANEOUS LITHIC ARTIFACTS FROM SQUAW ROCKSHELTER (33CU34) CUYAHOGA CO., OHIO, LEVEL II (IN MILLIMETERS)

CMNH Cat. No.	Length	Width	Thickness	Side Edge	Distal Edge	° of Retouch	Comments
Bifacial Scrapers:							
8049C	53.2	39.4	9.8	45°	55°-60°	270°	Test Unit 3, Level II. Heavily battered biface with proximal hinge fracture. No definite striae or gloss on any edges but distal end shows multpile step fracture. Glacial chert. Figure 11a.
9049B	31.4	21.7	5.4	45°	65°	300°	Test Unit 3, Level II. Numerous oblique striations on both faces along distal convergent edges; some gloss on reverse dorsal ridges, especially at proximal end. Glacial chert similar to grainy Bois Blanc. Figure 11b.
Bifacial Scraper/ Graver Tip:							
8077B	38.5	26.5	5.7	65°	60°	360°+	Test Unit 5, Level II. Distal end of scraper shows numerous transverse striae on ventral surface with minimal primary retouch. Obverse distal end shows much gloss and discontinuous small step fractures along edge. Dorsal and ventral ridges sho gloss. The grave tip shows no gloss or striations but numerous small step fractures from all face edges. Upper Mercer flint. Figure 11c.
Unifacial Scrapers:							
8048A	45.0	36.4	6.7	50°+65° on working edges	N/A	240°	Test Unit 4, Level II. This convergent scraper clearly functioned as a twist drill for much of its use. None of the retouched edges show striations of crushing except along the parallel 12mm of the tip; gloss is present on both faces. Glacial chert. Figure 11d.
8048B	24.6	22.8	7.6	55°	55°	280°	Test Unit 1, Level II. Small "thumbnail" scraper with heavy crushing of distal edge and transverse striation on distal ventral face. Gloss on most ventral ridges. Zaleski flint. Figure 11e.
8049D	40.2	25.4	9.4	45°	N/A	270°	Test Unit 3, Level II. This utilized flake shows extreme crushing, gloss, and oblique striation along concave edge; minimal crushing an dtransverse striations along convex edge. Plum Run flint. Figure 11f.
Drill Tip:							
8048C	27.6 at break	10.4	4.6	70°	N/A	N/A	Test Unit 2, Level II. Broken drill tip with transverse and oblique striations on both edges and faces. No gloss. Minimal edge crushing from counter-clockwise twisting. Upper Mercer flint. Figure 11g.
Bifacial Blade:							
8075C	51.4	18.7	9.6	60°	N/A	360°	Test Unit 5, Level II. No indications of use. Very limy glacial chert. Figure 11h.
Bipolar Core:							
8049E	26.4	11.4	5.9	N/A	65°	None	Test Unit 3, Level II. This *piece esquillé* shows no signs of use, other than severe battering of proximal and distal edges. Quartzite. Figure 11i.

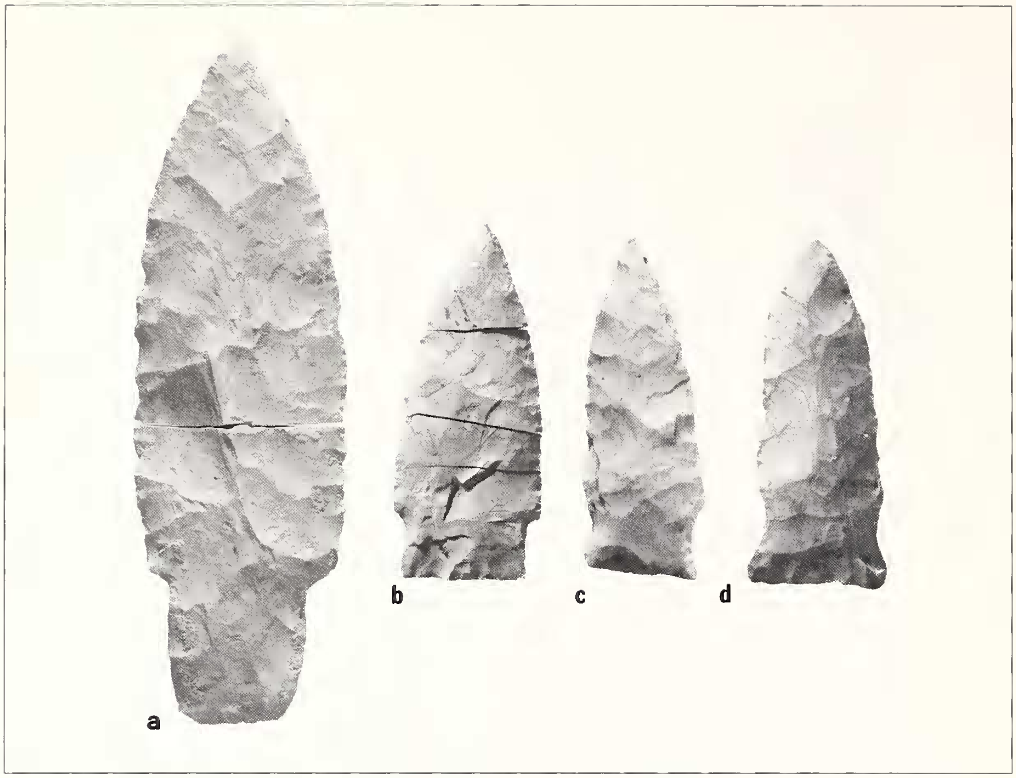

FIGURE 12. *Projectile points recovered from Cultural level I. See table 9 for sizes.*

Except for the absence of any cobble tools, there is a range of function and form in the Squaw Rockshelter deposit similar to that from other Early Archaic deposits reported in Georgia (Anderson and Schuldenrein 1985:V.I, fig. 10; Anderson and Hansen 1987: fig. 7), Tennessee (Chapman 1975, 1976, 1977), Pennsylvania (Michels and Smith 1967; Fitzgibbons *et al.* 1982:100-101; Rule and Evans 1985; Evans 1985; McMillan 1985; Marshal 1985), and Ontario (Ellis and Deller 1986:42-47).

Level I

From Cultural Level I there were four bifacial projectile points (Table 9); possibly one additional point, represented by a reworked base; two drills, one of which is represented by a tip only, a unifacial chopper and a bifacial scraper-plane (Table 10). The scraper-plane, encountered in a rodent disturbed contex, and one of the bifacial projectile points (CMNH #8075A) recovered from the surface of Level II following the removal of a block of slumped side-wall, may represent later occupation of the shelter: Both are reminiscent of Late Archaic types in this region (Kenyon 1980; Brose 1981; Payne 1982; Brose and Belovich 1984) although there is no other evidence of such a component.

The thick stemmed lanceolate point (CMNH #8075A: Table 8) resembles some gross version of the Scottsbluff points from the upper Mississippi valley and western Great Lakes (cf. Mason 1981:115-126), and some Hellgap points from Ontario (Ellis and Deller 1986:55). A number of finer such points have been recovered from what appear to be early sites in the western Lake Erie basin (Smith 1960:84-97, fig. 5,10; Brose 1976), and in the Mahoning and upper Shenango drainages of eastern Ohio (Blank 1970). But virtually identical Late Archaic points are known as Pigeon Roost Creek class 36.4 from the western Mississippi valley (O'Brien and Warren 1983:94), as a cline from the Karnak Stemmed type in Illinois (Cook 1976: 138-139) to the McWhinney Heavy Stemmed type of the central Ohio Valley (Justice 1987), and are illustrated as varieties of Savannah River points in the Carolinas (Coe 1964) and Genesee points in New York (Ritchie 1971:24-25, Pl.10). The uncertain provenance of this point from Squaw Rockshelter is unlikely to solve the problem of whether such forms are Early or Late Archaic, or both.

One relatively thin stemmed point (CMNH #8048F: Table 9) was recovered within Level I sediments associated with a feature dated to 5500±80 B.P. This point is similar to the Benton Stemmed examples dated 5840-5300 B.P. in the upper Tombigbee valley (Bense 1987; White, Lee and Bense 1983). Cook described similar points as Etly Barbed variants (1976:fig. 33e), and as Straight Stemmed Matanzas points (1976:fig. 38, lower left), elements of the Helton Phase, between 5440±100 and 4880±250 B.P. Ritchie's holotype Vosburg point (1971:55, pl.32, fig. 9), as well as variants of his Genesee point from the base of the stratified Laurentian deposits in south-central New York (1971:24-25, Pl.10, fig. 1, 2) are indistinguishable from the Squaw Rockshelter specimen.

TABLE 9

PROJECTILE POINTS FROM SQUAW ROCKSHELTER (33CU34) CUYAHOGA CO., OHIO, LEVEL I
(IN MILLIMETERS)

CMNH Cat. No.	Length	Width	Thickness	Tang to Base	Basal Width	Haft Width	Haft Length	Base Indent	Comments
8075A	116.4	45.7	18.1	34.5	20.8	28.1	23.2	•	Test Unit 5, Level I (sidewall slump). Heavily ground long base and for 17mm along lower blade edges. Glacial chert similar to western Lake Erie Devonian cherts. Figure 12a.
8048F	74.1	30.8	7.0	14.2	21.4	20.6	9.5	•	Test Unit 3, Level I, on floor near charred cordage. Feature No. 2. No grinding present. Point found broken *in situ*. Glacial chert. Figure 12b.
8046C	70.1	26.5	8.5	16.3	23.9	21.3	8.0	•	Test Unit 2, Level I. Base and both edges below shoulder heavily gground; gloss and striae along both edges. Plum Run flint. Figure 12c.
8048E	72.3	29.0	9.7	11.8	29.0	23.6	11.6	•	Test Unit 1, Level I. Heavy grinding of base and lower 13mm of edges. Glacial chert. Figure 12d.

Two complete projectile points recovered from Level I deposits at Squaw Rockshelter (CMNH #8046C, #8048D; Table 9) appear to be examples of a single morphological type. In Illinois they would be considered Matanzas Faint Notched or Flared Stemmed points diagnostic of the sixth millennium B.P. (Cook 1976:35-37, 70, 140-150, fig. 38, 39; Wiant *et al.*1983:152-154). Matanzas points, related to the Brewerton cluster in New York, appear at the begining of the Late Archaic French Lick Phase (Cook 1980:404-417) between 4835±85 and 3410±175 B.P. (Munson and Cook 1980:468-499), although Justice (1987:120) suggests that Matanzas points pre-date 4210±85 B.P. in Indiana. While Ritchie (1971) and Funk (1976) illustrated Otter Creek and Vosburg points from the proto-Laurentian Vergennes phase in eastern New York similar to the Squaw Rockshelter specimens, the Ohio points can more easily be considered variants of Brewerton Eared-Triangle and Brewerton Ear-Notched specimens (Ritchie 1971:Pl. 6, figs. 6,7,9). In southwest Ohio Vickery called these Brewerton variants (Justice 1987), and at floodplain sites in Pennsylvania and New York similar points are dated to 4980±110, and between 5850 and 5640 B.P. (McNett 1985:111); to 5580±225 B.P. (Calkin and Miller 1977:311, fig. d); and between 5400 and 4800 B.P .(Rippeteau 1973). In West Virginia and Pennsylvania similar points, called Brewerton Side-Notched, have been dated to 6090±240 B.P. (George and Davis 1986:14, fig. 3,d,m,l); to between 5500 and 5000 B.P. (George and Bassinger 1975:fig. 8.5,l); and unreliably to 4230±60 B.P. (Dragoo 1959:238). The rather unusual bifacial scraper (CMNH #8046A; Table 9) may well have been converted from a broken straight-stemmed point similar to CMNH #8048F. If so, the original point base has become a working edge, only one face of which was used to a degree resulting in observable wear (cf. Brose 1975). Heavy grinding on the old proximal blade section may have been to roughen the surface of the new stem for hafting.

The two drills (CMNH #8047A and #8047B; Table 10), recovered from the same small lens of soil, display significantly differing wear patterns. The smaller broken drill appears to have been used in a rotary fashion on woody material, but the larger drill may have been an awl. The large unifacial flake chopper (CMNH #8050A; Table 10) displayed no obvious signs of use, while the plane-like biface (CMNH #8050B; Table 10), whatever its original provenience, seems to have been used for everything.

These tools from Level 1 at the shelter are, again, remarkable chiefly because of their relative rarity. In Illinois, much higher frequencies of similar drills, scrapers and chopping tools were recovered from the coeval levels of the Koster (Cook 1976), Black Earth (Jeffries and Lynch 1983), Napoleon Hollow (Wiant *et al.* 1983), and the Bullseye (Hassen and Farnsworth 1987) sites, accompanied by numbers of ground-stone tools. In the Little Tennessee River valley, Chapman recovered relatively large numbers of chipped stone scrapers and drills from the early Late Archaic levels of the Harrison Branch and Iddens sites, although there were few ground-stone tools in association.

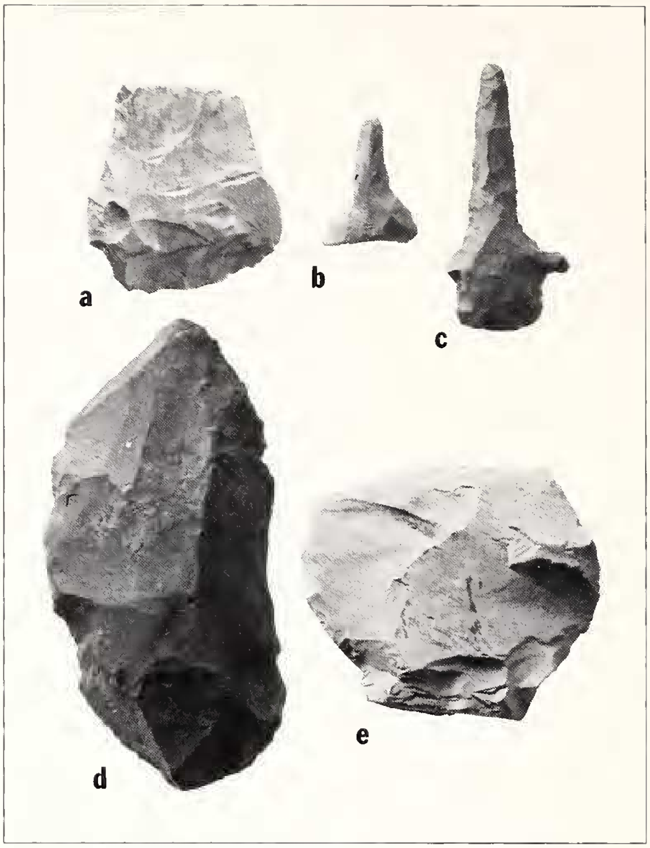

FIGURE 13. *Miscellaneous lithic artifacts recovered from Cultural Level I. See Table 10 for sizes.*

The Regional Context

Lithic Variability

The Squaw Rockshelter contained two stratigraphically sealed and radiometrically dated components. The lithic assemblages of both the Early Archaic and the late Middle Archaic occupation were quite variable. Of chief regional interest, the early Archaic lithic assemblage included both Plano projectile point styles of the Great Lakes and corner-notched type clusters of the southern Appalachians, while the late Middle Archaic local projectile points represent a blending of styles typical in the riverine midwest and the Mid-Atlantic states. Before seeking any significance for a potential realignment of spheres of influence from a north-south to an east-west axis, it may be well to look at just what such typological differences in those areas mean

As Brown (1980) stated, in the lower Illinois Valley, especially Koster horizons 13, and from horizons 11 (dated 8600 to 8500 B.P.) through horizon 6 (dated 6500 to 6300 B.P.), there is "an unbroken technological continuity" in lithic materials, especially projectile points. Brown noted

Table 10

Miscellaneous Lithic Material from Squaw Rockshelter (33CU34) Cuyahoga Co., Ohio, Level I
(in millimeters)

CMNH Cat. No.	Length	Width	Thickness	Shoulder to Base	Basal Width	Haft Width	Haft Length	Side Edge	Distal Edge	Comments
8046A	36.3	34.3	8.9	18.9	23.4	24.3	17.2	55°	N/A	Test Unit 2, Level I, reworked base of a stemmed point. Heavy grinding of base. Transverse striation on obverse distal edge. Glacial chert (Devonian). Figure 13a.
8047A	24.8	19.3	4.8	7.4	18.6	N/A	N/A	60°	60°	Test Unit 3, Level I, small drill with snapped base. Heavy chipping on all "point" edges. Multiple overlapping oblique striations. Plum Run flint. Figure 13b.
8047B	54.2	25.0	7.6	11.4	17.0	17.0	N/A	60°	70°	Test Unit 3, Level I, large spurred drill. Small lateral spur is highly polished and shows longitudinal striae only. Base heavily ground. Glacial chert similar to Bois Blanc. Figure 13c.
8050A	94.2	47.9	20.1	N/A	N/A	N/A	N/A	55°	45°	Test Unit 3, Level I. Large unifacial chopper. Step retouch along all edges except striking platform. No platform preparation. No striations. Gloss along dorsal flake scar ridges. Upper Mercer flint. Figure 13d.
8050B	51.7	61.2	14.2	7.6	32.3	32.3	8.1	55°	80°	Test Unit 3, Level I(II). Steep plane (bifacial) convex scraper. Minimal retouch on distal ventral surface. Transverse striations on all ventral edges. Heavy platform crushing. Glacial chert. Figure 13e.

that each areally extensive sealed horizon shows a waxing and waning of differing projectile point hafting categories, but that every unmixed sealed Koster component yielded from three to seven named corner-notched, side-notched, stemmed and lanceolate point types. The variable haft styles showed definite clusters so that any one of the activity foci at any occupation level might yield a predominance of one haft category (cf. Brown and Vierra 1983). Similar situations seem to have existed in Missouri, (O'Brien and Warren 1983:82-93, fig. 5.13), and in central Illinois (Lewis 1983:102-105), and also at Modoc Shelter in the Mississippi Valley (Styles, Ahler, and Fowler 1983). Montet-White (1973) documented the statistical significance of this phenomenon, but failed to explicate potential causes. The faunal assemblages indicate similar diffuse hunting/gathering economies with small game predominant. From Late Paleo through Middle Archaic there is unambiguous evidence for increasing reliance on seeds and nuts (Brown 1983).

In the east, a sub-continental synchrony of change in Early Archaic projectile points types seems anchored by a suite of radiometric determinations. It has been argued (Brose and Lee 1980) that hafting morphology within any eastern point "type" shows as much variability as do the sets of different point types from coeval sites to the west. Even allowing Coe (1964:123) to order the undated site profiles as best he can, his classic excavations do not exactly show one point type for one level.[2] This is clearly seen in his summary figure (1964:121). From 8400-7500 B.P. Palmer and Kirk corner-notched, Kirk side-notched and stemmed, and Stanly stemmed co-occur. From 7500-6500 B.P. Kirk stemmed and corner-notched, Stanly stemmed, Morrow Mountain I, and Guilford Lanceolate points exist at virtually every level.

Excavation of the St. Albans site along the Kanawha River in West Virginia exposed two areas of Early Archaic and stratified early Middle Archaic occupation (Broyles 1971:19- 20, 47-48). Type descriptions and accompanying illustrations (1971:53-76) suggest morphological and metric continua from large Kirk corner-notched, to Amos corner-notched, to Charleston corner-notched, to small Kirk corner-notched, to large Kirk corner-notched; and from Kanawha stemmed, to Kirk stemmed, to MacCorkle stemmed, to St. Albans side-notched variety B, to St. Albans side-notched variety A, to LeCroy Bifurcate base, to Kanawha stemmed. Indeed, Broyles herself (1971:71) noted this intergradation. Brose and Lee (1980) suggested that using the type descriptions, only Broyles' Kessel side-notched projectile points (1971:60-61) might be resorted into the same type. The statement that, "Each type of projectile point was confined to one or two zones..." (Broyles 1971:24), even ignoring presumably displaced Kirk and St. Albans points at the site (*ibid.*), reflects a situation where each "type" is arbitrarily segregated.[3]

The Little Tennessee river terraces revealed deeply buried sites, stratified from late PaleoIndian through Middle Archaic. At Icehouse Bottom (Chapman 1973, 1976); Rose Island (J. Chapman 1975, 1977); Patrick (Chapman 1977) Harrison Branch, Calloway Island, and Thirty Acre island (Chapman 1977), Bacon Farm (Chapman 1978), and at Howard Farm, with the largest Early Archaic exposures (Chapman 1978) there are consistent series of what Chapman (1977:52-55) called projectile point/knife Type Clusters. There is a Kirk corner-notched cluster dated between 9500 B.P. and 8500 B.P. (although Chapman prefers 9400 B.P. to 9100 B.P.) a Bifurcate Point Cluster between 9400 B.P. and 7800 B.P.; a Stanly (Kanawha?) Cluster between 8000 B.P. and 7000 B.P. and a Morrow Mountain phase from perhaps as early as 7000 B.P. (Chapman 1977;161-167). Within each discrete stratigraphic level, at each site where the "type cluster" exists, a variety of hafting morphologies co-occur.[4]

Thus, even in the prototypic sealed stratified floodplain sites of the Appalachian southeast, Late PaleoIndian stemmed and unstemmed lanceolate points, and Early Archaic side and corner-notched projeetile points co-occur. Further, in the levels running into the Middle Archaic, the named "type clusters" represent as much variability in hafting as would define distinct projectile point types in the midwest. It seems clear that, not only is there some importance to the excavated area of relevant levels (Koster = 625m^2; Napoleon Hollow = 435m^2; St. Albans = 240m^2; Icehouse Bottom = 170m^2; Neville = 54m^2; Hardaway = 42m^2; Gaston = 28m^2) as I had suggested (Brose and Lee 1980), but that differing schools of typology might be responsible for the apparent difference between Archaic horizons in the east and the midwest. If Early Archaic assemblages from the riverine midwest and the southeast indicate the potential variability in single components between 9400 B.P. and 4500 B.P., then stylistic or functional lithic variability is also expected in the ecologically complex region of northeast Ohio.

Local Lithic Assemblages

While diagnostic projectile points have been recovered from loci throughout northeast Ohio, which appear to be relatively "pure" Plano, "pure" Appalachian Archaic, or "pure" Laurentian, given the environmental complexity, there is little reason to expect that all Archaic sites would display similar variability. The McConnell workshop at the Nellie Chert quarry in the Glaciated Plateau, with a preponderance of lanceolate points is one example of a site of limited function, although even there other types were manufactured from specific preforms (Prufer 1963:13, 31 fn.2). The recovery of only Matanzas/Brewerton eared-notched points from the small Merkle 2 site, on a buried Cuyahoga River terrace (Brose 1975c:14, 20) related to a channel shift long after 8540±70 B.P. (Miller 1983), appears to be a site with similarly limited lithic style.

Based upon recent paleoecological and archaeological data, Brose and Lee (1980) argued that while some Archaic sites in northern Ohio may have been drowned, points recovered from the intermoraine region suggest that rather large sites now lie buried along major rivers, or were located in the adjacent uplands (Brose 1975c,1976a, Brose *et al.* 1981). Those sites, not functional equivalents of smaller occupations, should yield a considerable range in projectile point styles often considered representative of discrete Late PaleoIndian through early Middle Archaic occupation. I do not intend to suggest that multi-component sites with millennial lacunae do not exist: they surely do, and the Welti site (Fitting 1963), the Hospital and Academy sites (Brose 1975b:24-38), the Norman 'P' site (Brose 1976b) and perhaps the McKibben site (Prufer and Sofsky 1965) appear to be of that type. But, just as small "pure" sites have been reported, larger sites occupied between 9000 B.P. and 4500 B.P. exist and, like Squaw Rockshelter, display considerable lithic variability. Rather than an arbitrary segregation into PaleoIndian and Archaic occupations the assemblage from these sites may represent a single component.

Among reported sites of this type are the Hogue's Spring site in Cuyahoga County, Ohio (Brose 1975c:15-16), and the Holdson District sites 2,3, and 4 in Ashtabula County, Ohio (Brose 1977:83- 91). The recovery of Kirk, Dalton-like, and St. Albans side-notched 'A'/LeCroy Bifurcate Base projectile points, along with ovate bifacial knives in salvage of the Regis site, on a plateau above a tributary of the Cuyahoga (Brose 1975c:17,48) in Summit County, Ohio, may also be noted. Several undescribed sites known through test excavations also illustrate the lithic variability of this period.

The Cooper Hollow site on a bluff of the deeply incised Vermilion River in northwest Lorain County was identified by a band of unprincipled amateurs. I tested the area in the fall of 1972 and extensive excavations were conducted by Lee through the summer of 1974. The excavations revealed a sub-plowzone paleosol containing discrete areas of firecracked rock. Within a 180m^2 zone there was a large focal cleared zone and a large focal roasting pit, as well as several shallow pits. The overall site configuration is rather like that at Holcomb Beach (Fitting, DeVisscher, and Wahla 1966). The site yielded twelve complete finely made lanceolate bifaces which in hafting morphology grade from narrow based Cumberland to stemmed Scottsbluff lanceolate bifaces. They duplicate points from the Fisher site in Ontario (inspection of materials at the R.O.M. courtesy of Dr. Peter Storck, 1988). Twenty tip and midsection fragments also reflect this continuum. Lateral edge grinding is common but not ubiquitous. From sealed features and paleosol Lee recovered a corner-notched/stemmed point, and the lower lateral portion of the base of a Stringtown Spured-Stem or Hardin Barbed point. Excavation also yielded "Micro" drill tips, rough flake tools, cobble tools and choppers, and over 1100 fragments of debitage (15% used). Flotation of the roasting pit produced fragments of nut shell and fragmented calcined bone representing a large cervid. It also contained charcoal yielding an unacceptable 12,100±250 B. P. date for the PaleoIndian-Early Archaic occupation.

The Zigler Farm site, on the lake plain in southeastern Lorain county, sits on a knoll at the edge of a bog draining the West Branch of the Black River. Testing by N'omi Greber in the summer of 1973 recovered a single Cumberland point, two edge ground and four unground Scottsbluff points and five McCorkle-like points from undisturbed paleosols in ground undulations.

The Burrill Orchard site, sits on the point where French Creek joins the Black River in Lorain County. Excavation by Brose in the summer of 1971 revealed discontinuous areas of sealed paleosol and two pits. Among minute fragments of charred bone, the pits yielded five points grading from Hardin Barbed to Scottsbluff, and three points intermediate between Kanawha Side-notched and St. Albans Type B. Edge grinding occurs on most points. The presence of nearly 1m of overburden, and wishes of the sometime owners to preserve a peach orchard, prevented exposure of continuous site areas. Subsequent excavations 40m south along the same plateau (Brose 1978b) revealed an arc of post holes associated with a charcoal and ash-filled pit dated 7120±150 B.P. (DIC-734) containing one Hardin Barbed point, and one point which Chapman (c.f.1977:30-35, 163-168) calls Stanley/Morrow Mountain II.

With the clarity of hindsight, we can argue that not all of the "sites" documented by Prufer and Baby were multi-component. The data used to construct their Paleo Complex were abstracted, *post hoc*, from assemblages which contained bifurcate-based, expanding stemmed, and notched points in numerous varieties and frequencies. At the Sawmill site in Erie County, whose late PaleoIndian complex had been separated from a "later" component on the basis of 1963 professional typologies. Smith (1967) illustrated unambiguous Hardin Barbed, Charleston Corner-notched (some approaching Palmer in morphology) McCorkle Stemmed, St. Albans Side-Notched 'A' (or Kirk) and Thebes points as well as the types defined as late PaleoIndian. Like Squaw Rockshelter, these sites show no Archaic occupational hiatus across northeast Ohio. They reveal local assemblages which show stylistic and technological continuities despite the frequent morphological assignment of specific artifacts to discontinuous distant prototypes.

Speculations

To what cultural processes may we attribute the distinct Early Archaic lithic variability and the Middle

Archaic stylistic homogenization at Squaw Rockshelter? Answers must rest on assumptions concerning the number and composition of occupants; the season or seasons during which they used the shelter; and the economic activities that drew them to this portion of Aurora Branch.

Despite evidence from Michigan to Maine for a Clovis settlement system exploiting migrating caribou, Payne (1987:2) admitted that no clear evidence for any PaleoIndian settlement pattern has yet emerged in northwest Ohio. The same must be admitted for all of the state, and for the entire Archaic as well. No stratigraphic evidence recovered from either the Early or late Middle Archaic levels permits a decision as to whether Squaw Rockshelter was occupied at a single time or was intermittently reoccupied. Although artifacts in both levels were distributed through 10 to 30cm, in sediments of similar texture microbiotic processes and soil plasticity can vertically displace artifacts by 40cm or more (Hoffman 1986:167).

In eastern Pennsylvania, at Shawnee-Minisink (McMillan 1985:264), and at Sheep Rock Shelter (Michels 1968; Michels and Smith 1967) the Early Archaic is taken to represent transitory, limited purpose occupation by small band segments at the limit of their large range. At Sheep Rock the Middle Archaic occupation was seen as multi-purpose reoccupations for longer segments of the year by several families occupying a more demographically circumscribed territory. The latter interpretation appears to have been derived principally from analysis of regional projectile point relationships, not from any spatial data recovered at the site. So too, Michlovic (1976:14-15) offered ethnographic analogs suggesting that the observed blending of Archaic projectile point stylistic modes reported in western Pennsylvania may have been the result of ephemeral interaction by short term, limited work parties of mixed ethnic or social composition. Anderson and Hansen (1988) have proposed a social and economic geography model for the Early Archaic of the southeast coastal plain. Their model involves up to 10 bands of 50-150 people occupying the territory of a single river valley, congregating where resources are annually abundant to exchange information and genes (cf. Brose 1979). Matching the ethnoarchaeological data of Wiessner (1983), Anderson and Hansen see assemblages of hafted lithic bifaces displaying the greatest variability at the sites which represent the aggregation of several small bands. Curated tools and possibly the range of raw materials may also have higher frequencies at such sites. Somewhat in opposition to these conjectures, Behm (1985) has suggested an absence of distinct social territories in the Early Archaic of the Upper Mississippi Valley based upon analyses of spatial patterning of stylistic variation in projectile points.

While there would seem little potential for Squaw Rockshelter to have been inhabited by even one small band, several similar (yet untested) shelters in the environmentally diverse kame and kettle topography for 2km downstream along Aurora Branch could have been occupied contemporaneously. It actually remains unclear whether the Squaw Rockshelter ever housed a family. There is every reason to believe that most, if not all, of the stone tools recovered in either level could have been used (and many, if not most, of the tools could have been produced) by women (Gero 1988). Perhaps the increasing use of locally available and unheated chert to produce more expedient tools represents a shift to more female occupants from Early to late Middle Archaic period use of the site.

If the demography of the Squaw Rockshelter occupants is uncertain, the season in which occupation was probable may be approximated. Deller (1976:5-6) suggested that Ontario PaleoIndian and Early Archaic sites had southern exposures to protect from the north wind and to provide light. The latter would only be true in the winter, however, and early AmerIndians must have lived somewhere during other times of the year. Hall and Klipple (1988) argue that most occupied rockshelters on the Cumberland plateau had a southern exposure, suggesting occupation primarilly in the winter and early spring for protection from northern storms. Size of protected area, proximity to varied resource catchments and avoidance of flooding seem the factors which conditioned choices among shelters. Similar patterns have been observed in southern (Bush 1987:121-129) and northern Kentucky (C. Wesley Cowan, personal communication 1988), and to a lesser extent in eastern Ohio (Olaf Prufer, personal communication 1988), but most of those occupations postdate the Archaic.

If the northern exposure of Squaw Rockshelter argues against a winter occupation, the total absence of faunal remains, bivalves or any edible floral remains save a single burned fragment of walnut hull in Level I, may argue against occupation in the summer or fall. Storck (1982:23-25) suggests that fishing had more significance for late PaleoIndian site location than is usually considered, but it is unlikely many fish could have been procured this far upstream. In the late spring, with most resources in short supply, subsistence efforts may have concentrated at lakeshore marshes or upland fens and bogs where emergent vegetation and tubers could be obtained with little effort. While such resources were available nearby as early as the occupation of Level II, they could never have been capable of supporting social aggregates of any size, and the limited area available within Squaw Rockshelter may have been more than adequate for any population the catchment could sustain.

Like most such ethnoarchaeological models, the relevant environmental and cultural factors can be demonstrated only for late prehistoric or for subsequent periods. Their applicablity to any portion of the Archaic is conjectural at best, and present data are far too thin to support arguments concerning whatever cultural changes

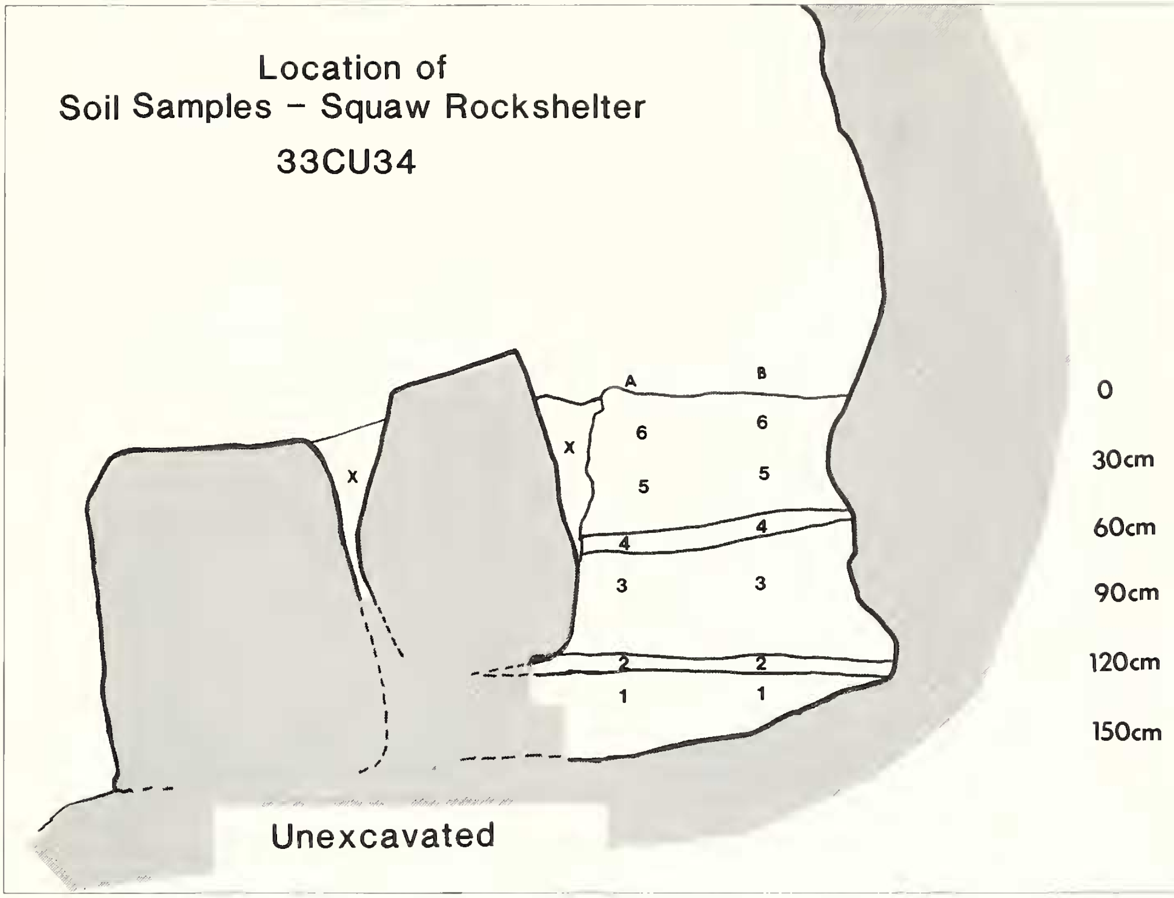

Figure 14. *Location of soil samples from the Squaw Rockshelter site.*

may have occured over the first two-thirds of that period. Nonetheless, I believe that the technical and stylistic data to be derived from such Archaic lithic assemblages as were present at Squaw Rockshelter can no longer be seen as mere indicators of gross chronological position and general inter-group relationships. For a vast stretch of time they constitute the only evidence we are likely to have from which to recover details of how critical functional and economic vectors may be tempered by variable social structure. To be sure, the quantity and the quality of the data are less than we might wish. But our potential for discovering more Archaic sites remains obscure, and our potential for less archaic interpretations is clear. △

Appendix

Sample Lithology

During the excavation at Squaw Rock Shelter a series of 1.50 liter soil samples were collected from the eastern corner of Unit 3. A series of column-like samples were also taken from the western edge of floors of Unit 5 (Figure 14). The frequency of fragments of sandstone embedded within the finer matrix of sands and silts precluded strict column sampling (cf. Farrand 1985). Sampling was also biased because irregular cobbles of sandstone roof fall, which far exceeded 64cm in every dimension, could hardly be included. Nor were the very fine silt and clay sized particles separated by hydrometry. The remaining samples, from pebble (-5 Phi) to fine silt (+7 Phi) were air dried, quartered and mechanically shaken through a nested column of Wentworth grade sieves. The relative frequency of each grade class by weight is presented as granulometric histograms (Figure 15) in which column A represents the excavation Unit 3 sample while Column B represents the sample from Excavation Unit 5. Small samples were also studied for grain lithology and wear (cf. Brose 1970:27-9), with the assistance of the late Dr. John Hall, Case Western Reserve University Department of Geology.

Sample A0

A moderately well sorted deposit of yellowish brown (10YR4/2) to strong brown (7.5YR5/6) fine sandy silt loam lying unconformably upon the eroded surface of the Bedford Shale at a depth of 155cm below survey datum, itself about 10cm higher than the surface in XU1. Included within the coarse fraction of this sample were several small rounded pebbles of black shale and several of quartzite. Coarse sands included about 60% quartz, and about 40%

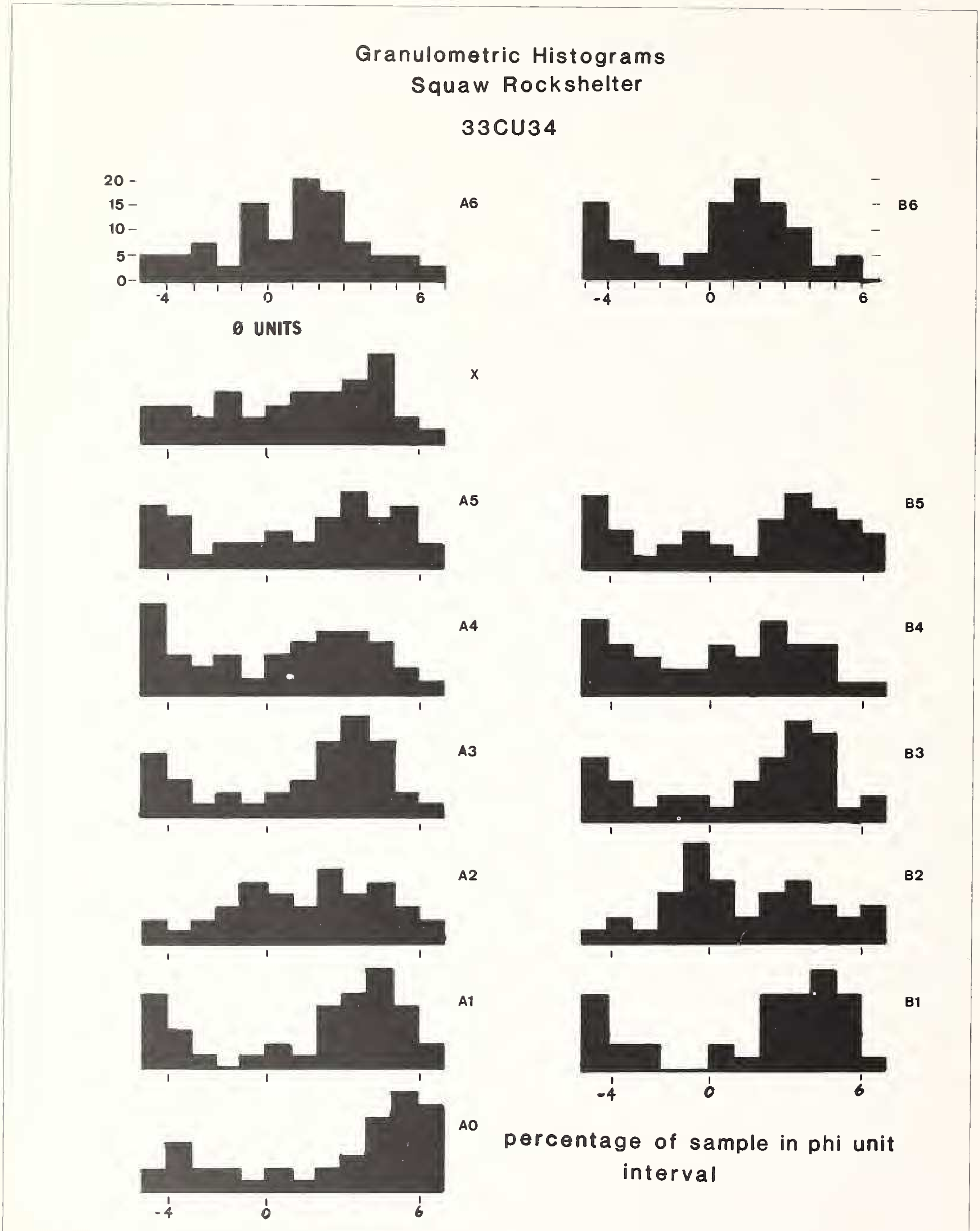

FIGURE 15. *Granulometric histogram of soil samples from the Squaw Rockshelter site.*

feldspars along with a few carbonate grains. Virtually no heavy minerals were identified in the sample. Hiram Till is always characterized as a silty clayey till with very few pebbles, predominantly of black shale, and rarely containing cobbles or boulders. The grain size distribution for local deposits is variously reported as sands: 15-20%; silts: 45-48%; clays: 33-40% (Shepps 1953; Winslow and White 1954; White 1982:25; White 1984:17; Szabo and Ryan 1981: 242).

Samples A1, B1

The small coarse sand sample analyzed revealed about 60% rounded grains, about 50% of which were feldspars, although a few grains of chert and tourmaline were present. The presence of the numerous large cobbles has shifted the relative histograms (Figure 15) toward the negative Phi units, but the matrix in which they are embedded appears to represent detritus chemically weathered from both the Bedford Shale and Berea Sandstone. The larger fragments are presumably detached by mechanical weathering processes such as freezing.

Samples A2, B2

Qualitative geochemical analyses indicate a rather high organic content (5% loss on ignition) and a neutral pH. The sedimentary sources for this deposit appear to have been chemically weathered predominantly from the Berea Sandstone. There were, within the medium to coarse sand sample, only a few grains of chlorite, garnet and zircon and most of the quartz grains were sub-angular (cf. Pepper *et al.* 1954:91-95). The A2 and B2 samples, when compared to the relative granulometric distribution of the local Berea "channel fill," show strong positive Phi skewness (Krumbein and Pettijohn 1938:229-254), especially laminae from within portions of Sample B2 along the rear shelter wall.

Samples A3, B3

Relatively similar predominantly dark yellowish brown (10 YR 4/4 to 10YR 3/6) and light yellowish brown (10YR 6/4) fine sands although small indistinct mottles of dark reddish brown (2.5YR 3.5/5) and strong brown (7.5YR 4/6) medium sands occur throughout the stratum. Quartz grains within these mottled areas tend to show considerably more rounding than do those in lighter colored areas of the deposit. No geochemical differences between mottled and unmottled areas was noted. Nor were there any significant differences in the low frequencies of heavy minerals (zircon, tourmaline, chlorite, and apatite), or in the rare presence of well-rounded pebbles of dark bluish gray (5B4/1) shale. Although a few coarse sand-sized grains of dolomite or ankerite were present in Sample A3, the entire deposit appears relatively acidic (pH 4.5). Neither organic nor cultural material was encountered.

Samples A4, B4

Analyses suggest some degree of water transport of sediments fallen from the roof and back wall with lower energy levels (or less frequent episodes) in the front shelter area. Those sedimentological processes resulting in the formation of Stratum 4 appear to have persisted throughout the period (or periods) of human occupation. It seems likely that persistent seepage across the fore-sloping zone was responsible for the removal of relatively finer sediments from the rear of the shelter. The lack of contiguous floor areas may be in part due to such a phenomenon. While the exact depositional nature of the stratum remains somewhat ambiguous, introduction of coarser sediments by overbank flooding or by wash in from areas upstream or upslope would seem unlikely. The rocks of the Orangeville Member and Bedford Formation exposed in those areas are both consistently finer than the Bedford Sandstone or the Stratum 4 sediments, and they display a far greater incidence of rounded grains and a very different suite of heavy minerals (Prosser 1912:519-30; Pepper *et al.* 1954:42-45, 91-95).

Samples A5, B5 and A6, B6

Within Stratum 5 there was a consistent difference in the grain size distribution skew from lower levels (Samples A5, B5) to upper levels (Samples A6, B6). Lower levels had a far greater frequency of silts, pebbles and small cobbles than did the upper levels. Rear wall areas of this deposit also exhibited a higher relative frequency of fine silts than riverward areas of the same depth. Although no bedding or lamellar structures could be identified within Stratum 5, there were significant differences between the front and the rear in the small pebbles included within the samples analyzed. Numerous sub-rounded shale and quartzite pebbles were encountered in Samples A5 and A6 while only a few well-rounded shale pebbles occurred in Samples B5 or B6. Within the coarse sand fractions, A5 and A6 yielded dolomite, quartzite and zircon while B5 and B6 yielded tourmaline and chert only. Although all of these minerals occur in the Berea Sandstone (Pepper *et al.* 1954:92-94) it seems clear from their spatial distributions and from inclusive clasts, that the depositional processes responsible for Stratum 5 were rather more complex than those responsible for the grossly similar Stratum 3.

Historical Reconstruction

The following scenario for the evolution of the Squaw Rockshelter is based upon regional geomorphology, analyses of deposits in the shelter itself, and a tentative sequence for collapse of large portions of the roof overhang[5].

1. Following the 12,500 B.P. drop of Lake Erie and the subsequent Chagrin River capture of upper Aurora Branch, lower Aurora Branch began retrenchment of late Pleistocene deposits in a pre-Wisconsinan valley.
2. Bedrock floor of Aurora Branch was exposed by fluvial erosion and Stratum 1, resorted Hiram

Till, deposited on Bedford Shale floor by 10,000 B.P.

3. Upper Stratum 1 minimally reworked by ground water flow. Large block of Berea Sandstone east of the Test Trench Excavation is detached from the edge of the shelter roof.
4. Prehistoric occupation in Squaw Rockshelter 9200 B.P. Stratum 2 deposits formed.
5. Reworking and sheet erosion of Stratum 2 surface. Fluvial removal of northern edge of deposit.
6. Large blocks of Berea Sandstone detached from overhang fall between Aurora Branch and Excavation Units 1, 5, 3, and 2.
7. Accumulation of Stratum 3 primarily by in-place weathering of overhang. Much roof fall, little chemical weathering or water sorting.
8. Large block of Berea Sandstone from overhang falls into position south of Excavation Unit 3, west of Excavation Units 2 and 4.
9. Prehistoric occupation in shelter while chemically and mechanically weathered Stratum 4 sediments accumulate through gravity and low energy ground water. 5500 B.P.
10. Deposition of lower Stratum 5 from roof fall and reworked upstream deposits. Large fractured block of Berea Sandstone roof falls between test trench and Excavation Unit 1. Large block of Berea Sandstone falls south of Excavation Unit 4.
11. Deposition of upper Stratum 5, sediments from chemically weathered shelter wall.
12. Modern use of surface of Stratum 5, A.D. 1870-1970.

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Notes

[1] It is possible that these disturbed and redeposited sediments had previously been noted as an archaeological site. A 1953 catalogue card of the Western Reserve Historical Society (53.471) lists an earlier donation by Mr. George E. Tow[N]er of the "Seventeen Indian relics picked up near Squaw Rock at Chagrin Falls." Though shown as being in box 305 on shelf 15, those "relics" could not be located with certainty nearly 25 years later. One artifact box with no provenienee designation, found on what may have been shelf I5 within that storage room, contained two eomplete and three broken bifacial blades and a single St. Albans side-notched point (Variety A [Broyles 1971]). All were made of Upper Mercer flint.

[2] Coe's excavations at the Hardaway site (basal level IV) yielded only Hardaway points. Level III yielded Hardaway blades and Hardaway side-notched, Palmer Corner-notched, Kirk Corner-notched and stemmed, and even a few Stanly and Morrow Mountain stemmed points. Level II contained everything from Stanly through protohistoric triangular Caraway points (Coe 1974:56-83). At Doerschuk zone XI yielded Stanly stemmed points with hafting morphology ranging nearly from Bifurcate base to side-notched (Coe 1964:36). Zone X yielded Morrow Mountain I and II stemmed points only, while Zone V, VI, and VII each yielded a variety of stemmed and unstemmed lanceolate points (Coe 1964:14-50). At the Gaston site each level from 24" to 68" below surface showed mixed assemblages of unstemmed lanceolate blades and stemmed and side-notched points (Coe 1964:84-91, 107-112).

[3] Every sealed level at St. Albans site shows variation in the projectile point/knife hafting: The earliest levels yielded both Dalton/Hardaway and Palmer corner-notched. All Charleston components (Levels 32-36 at 9800±500 B.P.) included unstemmed lanceolate; (Palmer and Charleston) corner-notched; and (Kessell) side-notched points and knives. All Kirk components (Levels 14-20 dated between 8930±160 B.P. and 8800±320 B.P.) included (Kirk and/or MacCorkle) eorner-notched; (Kirk) stemmed; and (St. Albans) side-notched points as well as unstemmed lanceolate knives. St. Albans components (levels 11 and 12, dated from 8830±700 B.P. to 8820±500 B.P.) included Kirk and MacCorkle corner-notched; (St. Albans) side-notched; and (Kirk or tentative MacCorkle) stemmed. LeCroy components (Levels 6 and 8 dated at 8250±100 B.P.) included (LeCroy Bifurcated based) corner-removed or corner-notched; (St. Albans B) side-notched; and (Kanawha) stemmed projectile points. And, finally, all of the Kanawha components (Level 4 and 6 dated to 8250±100 B.P. and 8160±100 B.P.) contained (LeCroy Bifurcated base) corner-removed or corner-notched; and (Kanawha) stemmed projectile points and unstemmed lanceolate and side-notched knives and blades.

[4] For example, the stratum X Kirk Complex at Howard Farm ineluded (Kirk) eorner-notched; (category 6, 13/14, and 17) stemmed; and (category 7) expanded stemmed/side-notched point/knives (Chapman 1978:16-21-32) while at Icehouse Bottom the 170m^2 exposures of the equivalent "Upper Kirk" component (Strata I-L) included (large and small Kirk) corner-notched; Hardaway-Dalton; (St. Albans and Pseudo) side-notched; and a variety of (LeCroy Bifurcated) stemmed point/knives (Chapman 1977:26-57). The same variability is seen in late Middle Archaic components. Morrow Mountain levels VII and VIII at Howard Farm yielded (Kirk, Morrow Mt. Indeterminate, and Categories 6 and 17) stemmed; (category 7) expanding stemmed/side-notched; and (Kirk and Eva II) corner-notched projectile point/knives (Chapman 1978:14-16, 21-30).

[5] Just below Bridge Street in Chagrin Falls, the walls of the Chagrin River gorge are composed of laminar-bedded Berea Sandstone. The existing property surveys and historical records from 1834 (Johnson 1879) indicate that the topography of this area has remained relatively unchanged for over a century and a half. The Berea outcrop, where unaffected by recent protective baekcutting, is a light buff to steel blue grey in color,

characteristic of what Bownocker (1915:114) called "recent exposure".

In the South Chagrin Metropark, the bas-relief Squaw-and-Snake figure was carved into a fallen block of Berea Sandstone in 1884. The foreset beds of the block are now vertical, showing discontinuous and moderate degrees and depths of banded ferruginous staining on only a few of the higher relief areas. A comparison with the Chagrin Falls gorge suggests that the Squaw Rock block had been in place for over 150 years when the carving was made. Some estimate of the relative sequence, if not the period, at which large blocks of roof fall took place has been obtained by a comparison of the degree of iron staining seen in their cross-bedding and, the staining seen the cross-bedding exposed in still intact sections of the shelter wall.

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